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LECTURES ON MOTOR ANOMALIES*

A. BIELSCHOWSKY, M.D.
Hanover, New Hampshire

I. THE PHYSIOLOGY OF OCULAR MOVEMENTS

Not only the novice but also many well-trained and experienced oculists consider motor anomalies to be the most difficult field in ophthalmology because of the great variety of signs and symptoms which frequently cannot be reconciled with one another. Wrong diagnosis, due to inability to analyze these factors correctly in individual cases, leads to unsatisfactory therapeutic results.

In examining and treating motor anomalies, one never loses an uneasy feeling of incompetence until he has become thoroughly familiar with the physiologic fundamentals from which the signs and symptoms of those anomalies are to be derived. Therefore, a discussion of motor anomalies of the eyes should begin with a synopsis of the physiology of the sensorial and motor apparatus of the eyes.

There is a fundamental difference between seeing with two eyes and binocular vision, the latter being confined to the higher vertebrates and man. In lower animals the two eyes—at least with respect to the visual sensations—are independent of each other. They have two visual fields that are entirely different, because their eyes are situated at the sides of their heads. Their optic nerves undergo a complete decussation, so that excitations arising from one retina are conveyed to the occipital lobe of the opposite side. But in higher vertebrates and man, the two eyes have a considerable part of the visual field in common, and there is only a partial decussation of the optic nerves. It is due to the latter reason that excitations arising from both the left temporal and the right nasal halves of the retinae are conveyed to the left visual area of the cortex, and that any lesion of that area will produce scotomata of approximately identical size and shape situated at the same place of the right half of the visual field of either eye.

The anatomical arrangement of the visual pathways and centers is the basis of sensorial or retinal correspondence, due to which the two eyes, under normal conditions, are to be considered as the halves of a single organ, comparable to a cyclopean eye. If the two retinae were superimposed so that the foveae as well as the corresponding meridians covered each other, this double retina would represent the retina of the imaginary cyclopean eye, which would be situated at the root of the nose. Its nodal point would be the center of the subjective visual directions.

The main characteristics of normal retinal correspondence based on innate conditions are presented by the fact that each pair of corresponding points on the retinae has one and the same subjective visual direction, along which the objects imaged on those points are localized. For

*From the Dartmouth Eye Institute, Dartmouth Medical School, Hanover, New Hampshire. Read before the Seventh Annual Mid-Winter Clinical Course of the Research Study Club, Los Angeles, California, January 17, 1938.

instance, images lying on f_1 and f_2 in figure 1 are seen in the direction of F, proceeding from that point of the cyclopean retina where f_1 and f_2 are imagined to be superimposed. Between the principal visual direction, as we call the direction in which the objects imaged on the two foveae are localized, and the visual directions of any other pair of corresponding points is an angle determined by the arc between those points and the foveae.

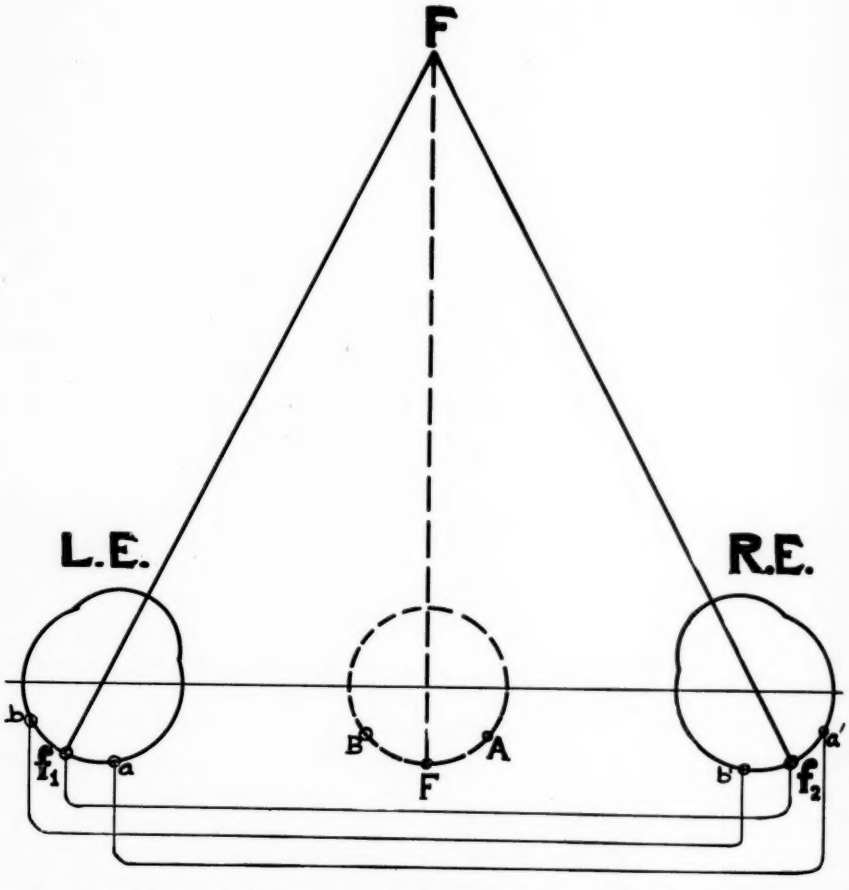


Fig. 1 (Bielschowsky). Normal retinal correspondence. The visual directions of f_1 and f_2 proceed from F, the fovea of the imaginary cyclopean eye. A and B represent the points from which the visual directions belonging to a and a', b and b' would proceed.

The fact that the geometric lines of direction—that is, the lines connecting retinal points through the nodal points with outlying objects which are imaged on those points—are not coincident with the subjective visual directions where the objects are located is illustrated by figure 2. Outlying objects, such as P, S, and N, being situated in different objective directions, will be seen by the observer in one and the same subjective visual direction (C Σ) in which images situated on the two foveae are located.

There is no better way to ascertain and demonstrate the sensorial relations between the two eyes than by means of

afterimages. One may produce in one eye a horizontal and in the other a vertical afterimage of a glowing filament, the center of which is concealed by a black ring with a fixation mark. The latter will be fixated alternately by each eye for about 10 seconds while the other is covered. Everyone with normal retinal correspondence will see in a dark room the positive, or in a bright room the negative afterimages forming a cross, because the centers of both afterimages are situated on the foveae. Whatever the position of the eyes relative to each other may be, it cannot influence the position of the afterimages relative to each other so long as the normal retinal correspondence is functioning. One may displace one eye with a finger or with forceps: the figure of a cross formed by the afterimages will remain unchanged, their centers being fixed on the two foveae. The same is true in nearly every case of paretic squint but only in a minority of cases of concomitant squint, particularly those in which the squint has not developed in early childhood.

Identical stimulation of corresponding areas of the two retinae, usually arising from one outlying object, always produces a single sensation, provided the sensorial correspondence is intact. Different stimulations of corresponding points, produced, for instance, by a stereoscopic or haploscopic arrangement, are likewise localized in one and the same visual direction belonging to that pair of corresponding points. As a rule, however, they are perceived not simultaneously but successively, appearing and replacing each other at certain intervals (physiologic rivalry).

There is, indeed, a certain predominance of one eye, met with rather frequently in people with normal binocular vision who prefer to use one eye at their work. Loss of physiologic rivalry is the first step toward the development of suppression, which is one of the characteristics of the visual act in strabismus.

In distance vision with parallel visual lines, the images of all objects situated

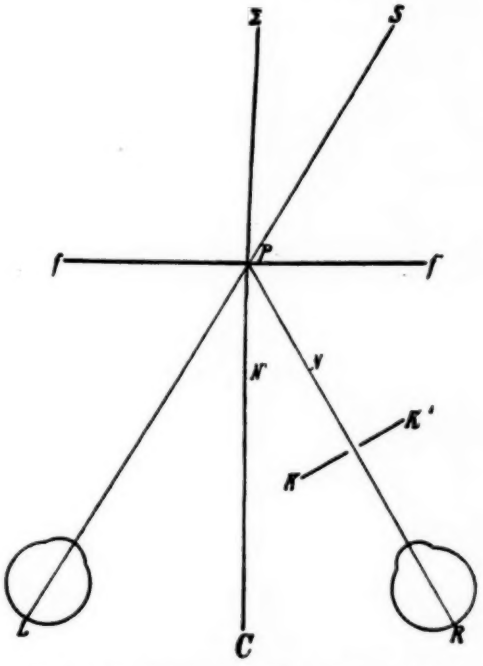


Fig. 2 (Bielschowsky). The left eye is looking through a window-pane (f f') at an object outside (S) that is partly covered by an ink spot (P) made on f f'; the right eye is covered If both eyes are then directed at P while a cardboard (K K') with a pinhole is held before the right eye and a needle (N) is brought into the visual line between P and K K', the image of S (Σ), and the images of P and N (N'), will be located in one and the same visual direction (C Σ) because they are situated on corresponding retinal points.

beyond a certain distance are formed in corresponding areas. But in near vision there are very few objects which can be imaged in this way.

Strictly speaking, the only points that can be imaged on corresponding retinal points in near vision are those which, passing through the fixated and the two nodal points, compose the Vieth-Müller horopter circle (fig. 4). Objects outside

or inside that circle are imaged on non-corresponding (disparate) retinal areas; therefore they should be seen double as, for instance, the images l and r of an object A in figure 5. But instead of being seen as uncrossed double images localized in the visual directions ϛa and λa, the object A will appear single, localized approximately in its real place; that is, to the right of, and farther away than the fixated point P. This applies to all objects imaged on disparate retinal areas, provided the disparity is small. But even images with a comparatively large disparity do not, as a rule, appear double, either because one does not pay attention to objects imaged on peripheral parts of the retinae, or if such objects do attract attention the foveal lines of direction are turned almost automatically to them, so that the images are shifted from the disparate areas to the foveae and are fused before the person becomes aware of seeing double.

Binocular vision attains the maximum of perfection through the intimate connection between the sensorial and the motor apparatus of the eyes. The primary function of the latter is to transport peripheral retinal images of objects which attract one's attention to the areas of greatest visual acuity, the maculae. These movements are, indeed, made almost automatically, but they are not true reflexes, for the visual stimuli must be conveyed to the cortex in order to induce the ocular movements. Since the images of distant objects are formed on corresponding areas they can always, by a parallel and equal movement of the two eyes, be made

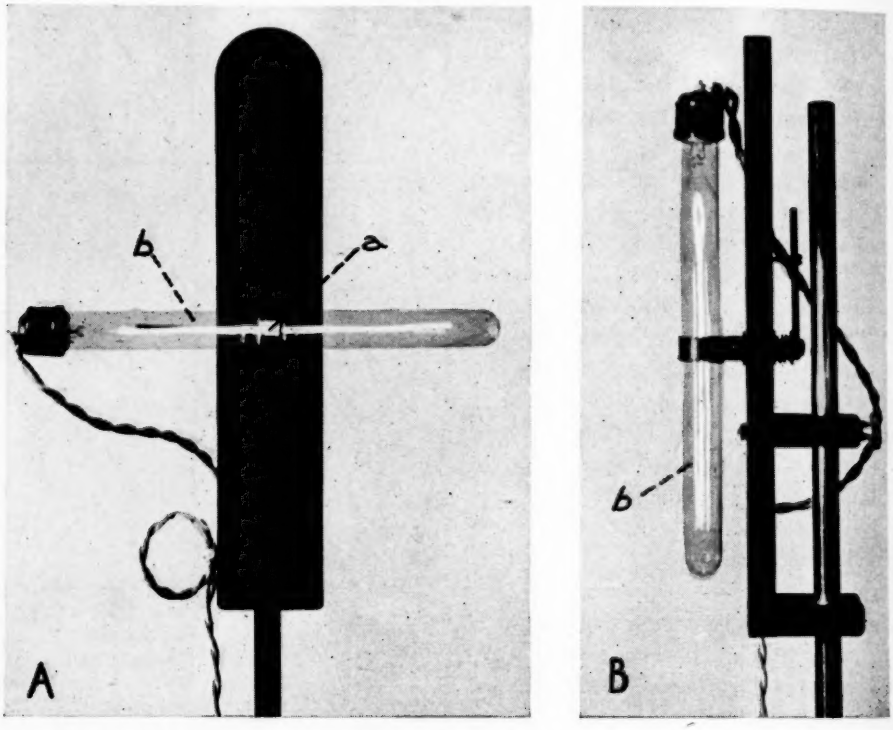


Fig. 3 (Bielschowsky). Arrangement of the afterimage test. In A, a is the fixation mark on the black ring covering the center of the glowing filament, b. In B, the glowing filament, b, is in the vertical position.

to lie on the maculae. But, as mentioned before, in near vision most objects are imaged on disparate—that is, noncorresponding—areas. To get disparate images of an object shifted to both maculae requires a nonparallel movement; namely, either an increase or decrease of convergence, depending on whether the object is nearer or farther away than the fixated distant point. A *symmetrical* convergent movement would transfer the images of such an object from the peripheral areas to the maculae, if the fixated point as well as the nearer object

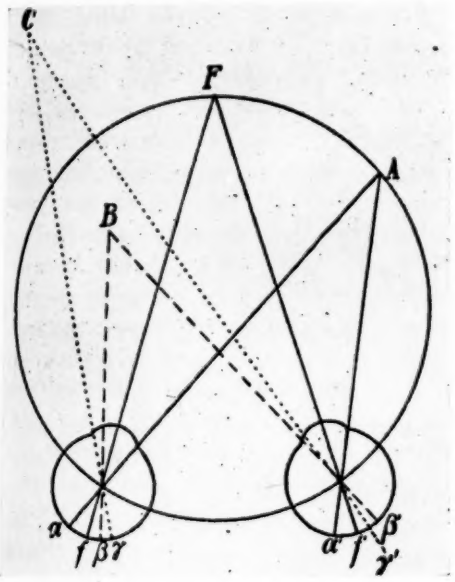


Fig. 4 (Bielschowsky). Vieth-Müller's horopter circle. Points F and A which lie in the horopter are imaged on corresponding retinal points f and f', and a and a', respectively. B and C lying inside and outside the horopter are imaged on noncorresponding (disparate) points β and β', γ and γ'.

were situated in the median plane of the head. But if the near object does not lie in the median plane the convergence impulse has to be combined with a lateroversion impulse in order to get the images to lie on the maculae. Due to the combination of both these impulses an asymmetrical or even a unilateral movement of the eyes must result. Suppose, while both eyes of a person are directed to a distant point, a near object, for instance a pencil, is brought into his left visual line, so that the top of the pencil just covers the distant point. If the person

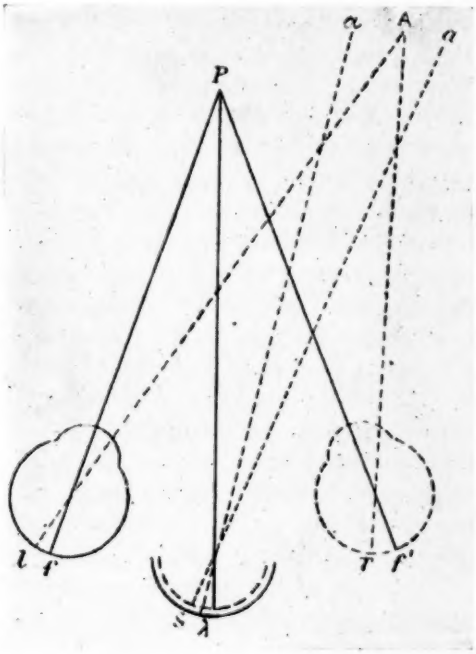


Fig. 5 (Bielschowsky). An object, A, imaged on noncorresponding retinal points l and r ought to be seen double in two different directions proceeding from ς and λ; but since the disparity of the two images is small, A will be seen, as a rule, single, in approximately the right direction.

is now asked to look at the top of the pencil, his right eye will be seen to move to the left, while the left eye seems to remain stationary. The same will happen if one puts a rather strong prism base out before the right eye while looking at a distant point. At first one will see crossed double images of the point, but very soon it will appear single again. Another person observing the subject's eyes during the experiment will notice an isolated inward movement of the right eye

and an isolated outward movement on removing the prism, which causes one, for a moment, to see uncrossed double images of the fixated point.

Some ophthalmologists, referring to people who can move one eye alone, have doubted the validity of the fundamental law of ocular movements, according to which it is impossible to send a motor impulse to one eye only, or a stronger innervation to one eye than to the other. But the fact that the single eye can be moved separately does not prove that the movement is produced by a unilateral innervation. In the experiments just discussed, two impulses are given, one for convergence and the other for turning the eyes to the left. In the first-described experiment, as soon as the attention is directed to the top of the pencil held in the left visual line close to the eye, an isolated convergence impulse would produce a symmetrical adduction movement of the eyes so that the visual lines would meet in the median plane and neither eye would get a macular image of the pencil. That can be obtained only by a simultaneous levoversion impulse strong enough to compensate for the effect of the convergence impulse in the left eye, so that the left visual line will keep the position unaltered in which an image of the pencil is formed on the macula. The right eye, which is driven by the convergence impulse to the left, but not so far as is necessary to get a macular image of the pencil, because the latter is situated to the left of the median plane, will be driven by the levoversion impulse as far to the left as is necessary to make its visual line meet the other visual line at the top of the pencil. A prism, base out, held in front of the right eye will displace the image of the fixated point from the right macula to an eccentric point in the temporal half of the retina, so that crossed double images will be seen. To fuse these two images a convergence innervation is required. This would drive both lines inward at an equal angle, and the left eye would lose the fixation unless, at the same time, a levoversion impulse would compensate for the effect of the convergence innervation of the left eye, while the right visual line is driven by both impulses to the left so that it can meet the left visual line at the fixation point.

The highest degree of perfection of binocular vision is represented by fusion movements, as we call those eye movements by which the images of an object situated outside or inside of the horopter and attracting one's attention, are brought from disparate to corresponding areas so that they can be fused. If images of the fixated object are slightly displaced by means of prisms or a haploscopic apparatus, the compensating fusion innervation will restore binocular vision without, or even against, one's will. For this reason one speaks of compulsion to fusion. As long as the fusion mechanism is functioning, there may be a temporary but never a permanent strabismus; the former in periods of fatigue or inattention in cases of heterophoria, which is kept latent most of the time by the fusion mechanism. More than 80 percent of human beings would squint were it not that the fusion apparatus prevented it by keeping heterophoria latent. Deficiency or complete loss of the fusion faculty is, as we know, the most important factor in the etiology of strabismus.

The ocular movements are to be classified into three different groups: voluntary, fusion, and reflex movements. The first group comprises the parallel movements, such as dextroversion, levoversion, supra- and infraversion, also the parallel movements taking place in oblique directions, and finally—at least, to a certain extent—the increase or decrease of convergence. These movements can be produced either voluntarily or at command, or without the individual's being aware of inten-

tion, by sensorial (visual, acoustic, tactile) sensations.

The second group comprises the fusion movements, which are elicited by an object imaged on disparate retinal areas as soon as it attracts attention. Fusion movements are nonparallel, sometimes unequal or even unilateral movements, if the nonparallel movement is combined with a parallel movement, as was discussed before, by which the disparate images are shifted to corresponding areas, usually the maculae. Being independent of the will, fusion movements are called psychooptic reflexes because they take place only if the sensorial stimulation, arising from disparate retinal areas, attracts attention. The only true reflex movements, the nervous pathways for which do not pass the cortex, are induced by vestibular stimuli arising from varying postures of the head or body. We shall return to the subject of true reflex movements of the eyes in the discussion of the symptomatology of ocular palsies.

The muscles of the two eyes coöperate in different combinations according to whether they are brought into play by centers governing the voluntary, the fusion, or the vestibular movements. There are six muscles in each eye, two lateral and four vertical motors. Their function depends (1) on their physical qualities; (2) on their topographic relations to the eyeball—that is, their course between the origin and the insertion into the sclera—further, on the size and shape of the orbit and the eyeball, on the fascial ligaments, on the tissues around and behind the eyeball, and on the quantity of the retrobulbar fat. Finally, the muscular function depends on the relation between the muscle plane which divides each muscle into two halves, and the ocular meridians and the visual line, respectively, in a given moment.

If the head and eyes are in the primary position, contraction of both the external and the internal rectus will produce a simple lateroversion of the visual line, provided the insertion of those muscles is symmetrical to the horizontal plane of the eye, so that the visual line lies in the muscle plane. But in its primary position the visual line deviates from the muscle planes of the vertical recti as well as from those of the oblique muscles. The muscle planes of both the vertical recti muscles are practically coincident, extending from the posterior and nasal part of the orbit—namely, from the foramen opticum to the anterior and temporal part of the orbit—thus forming an angle of about 27 degrees with the visual line while this is in the primary position. Therefore, the contraction of either vertical rectus muscle cannot produce a simple vertical movement of the visual line from its primary position, but apart from the vertical there will be a relatively small inward movement and a slight conclination (intorsion) or disclination (extorsion), respectively, of the vertical meridian. If the visual line is abducted at an angle of 27 degrees the contraction of the vertical recti will produce neither an inward movement nor a torsion, but merely an elevation, or depression, respectively, because now the visual line lies in the muscle plane. The more the visual line is adducted the more it will deviate from the muscle plane of the vertical recti. If an adduction of 63 degrees were feasible the visual line would be vertical to the muscle plane of the vertical recti and they could no longer produce a vertical movement. The only effect of the contraction of the vertical recti would be a meridional conclination or disclination. The inferior oblique arises at the lower margin of the orbit near its inner extremity. Although the superior oblique, together with all the recti muscles, has its origin close to the foramen opticum, the trochlea is to be considered as the functional origin of the superior oblique, so

that we may say that the oblique muscles have their origin in the anterior and nasal part of the orbit, while the insertion is on the temporal side of the posterior half of the eyeball. They have practically a common muscle plane, forming an angle of 50 degrees with the visual line if the latter is in the primary position. From the topographic conditions one can realize that the visual line cannot be elevated or depressed from the primary position as much by the action of the oblique muscle as by that of the vertical recti. In that position of the eyes the oblique muscles produce more torsion than the vertical recti, the superior oblique conclination, the inferior oblique disclination; apart from that both muscles have an abducting component. The more the eye is turned out, the more the angle increases between the visual line and the muscle plane of the oblique muscles. After the visual line has moved outward at an angle of 40 degrees, it forms a right angle with the muscle plane of the oblique muscles, which now no longer have any influence on the elevation or depression; nor are they able to produce a lateral movement. The only function they can exert in this position of the visual line is rotation of the eye about the anteroposterior axis; that is, conclination or disclination. If the eye is turned in at an angle of 50 degrees, the oblique muscles will have the maxium influence on the vertical movement of the visual line, since it now lies in the muscle plane. In this position of the eye the oblique muscles cannot produce any torsional movement. Owing to the coöperation of the oblique muscles with the vertical recti muscles, the eyes can be elevated or depressed from the primary position without any meridional deviation, because the two elevator muscles are antagonistic with respect to the torsional and the lateral ocular movements, so that they compensate each other. Further, the eyes can be elevated or depressed from any secondary position approximately as much as from the primary position, because the more the influence of a vertical rectus on the vertical movement decreases or increases, according as to whether the visual line is moved inward or outward, the more will the influence of the coöperating oblique muscle on the vertical movement increase or decrease, respectively, in approximately the same proportion. Thus, one has to bear in mind that the vertical recti play the main part in the elevation or depression movements if the eye is in the primary, and, still more, if it is in an abducted position, whereas the oblique muscles play the main part as elevators or depressors of the abducted eye. I should like to emphasize this statement, because to the novice it may seem in contradiction to the fact that by an isolated action of a superior rectus the eye is turned up and in, whereas by the contraction of the oblique elevator the eye is turned up and out. But there is no contradiction. Under normal conditions, no isolated action of one ocular muscle occurs. In every movement, even if it could be accomplished by one muscle alone, all the eye muscles always participate, one group as agonists being contracted, the other group as antagonists being relaxed. An isolated contraction of the superior oblique would indeed turn the eye from the primary position down and out, while at the same time the top of the vertical meridian would be tilted toward the other eye (conclination). But in the ordinary (normal) act of seeing, three muscles coöperate as agonists in turning the eye down and out: the inferior rectus, the superior oblique, and the lateral rectus. The more the visual line is turned out the more will the depressing component of the superior oblique decrease because of the increasing angle between its muscle plane and the visual line, whereas the depressing

function of the inferior rectus will increase in approximately the same proportion as the visual line approaches its muscle plane. Therefore, in a case of total paralysis of the superior oblique there is no restriction in the *temporal lower* quadrant of the field of fixation, but there is a restriction in the *nasal* lower quadrant, because to turn the eye down and in to the normal extent without the coöperation of the superior oblique, the combined action of the internal and the inferior rectus is not sufficient if the angle between the muscle plane of the latter and the visual line approaches 90 degrees.

The limits of the field of fixation are not identical when measured in different individuals with normal motility. By far the greatest differences are to be found in the upper limits, due to the different position of the anterior pole of the eyes in relation to the upper margin of the orbit. The farther back in the orbit the eyeball is situated, or the shorter it is, the sooner will the visual line, while moving up, be cut off by the upper orbital margin, whereas in individuals with prominent eyes and flat orbital margins the extension of the upper part of the field of fixation will be found to be relatively large. The range of supraversion varies in different individuals with normal ocular motility between 20 and 47 degrees, that of infraversion between 43 and 62 degrees, that of both forms of lateroversion between 40 and 50 degrees.

For an exact determination of the field of fixation the perimeter method used ordinarily is not sufficient because one cannot be sure whether the object, moved along the perimeter arc, is still imaged on the fovea, or whether it is recognized in spite of its image being shifted at an eccentric (paracentral) retinal point, while the visual line lags behind. The only exact determination of the field of fixation can be obtained by means of an afterimage, the center of which must be located on the fovea. During the movement of the eye in the different directions it will be seen to move on a screen only as far as the visual line can be turned by the maximum effort.

If the limits of the uniocular field of fixation are found to be normal—that is, to coincide with the average normal limits—one must not conclude that this is proof of an intact motility. It would be reliable proof if only the maximum innervation would enable the eyes to reach the normal limits. But for this a moderate innervation is sufficient, inducing a contraction of the ocular muscles of about one fourth of their length, whereas the other muscles of the body—for instance, those of the extremities—are reduced by a maximum innervation to half their length. The exceptional behavior of the ocular muscles is explained by the fact that the limits of the field of fixation are determined by check ligaments. The check ligaments are parts of the muscular fascia, being inserted in the orbital bones. They prevent a larger movement of the eye, which might be obtained without them by a maximum contraction of the muscles. Therefore, even people with a slight paresis of one of the muscles may not display a measurable restriction of the *uniocular* field of fixation because the paretic muscle, by means of a maximum instead of a moderate innervation, is able to move the eye to the normal limit. Only by determining the *binocular* field of fixation, or the field of binocular single vision, which is practically the same, will one find the restriction due to a unilateral paresis, because the moderate innervation producing the maximum movement of the normal eye will be insufficient on the paretic side, so that this eye will lag behind. This behavior is one of the proofs of the general validity of the

fundamental law of the eye movements. According to this law both eyes are always influenced equally by voluntary, fusion, or vestibular innervations, so that it is impossible to send a stronger innervation to one eye than to the other.

As I have mentioned before, all the ocular muscles participate in producing every movement of the eye. A certain motor impulse brings about the contraction of one group of muscles, called agonists, and at the same time the relaxation of the other group, called antagonists. Sherrington demonstrated that the stimulation of the cortical center for a lateral movement causes the contraction of the agonists as well as the relaxation of the antagonists. This relaxation takes place even in cases in which the agonists are not functioning, whether from a total paralysis of those muscles, or because their nerves have been cut experimentally. This fact is important, because the lengthening of the antagonists in the normal act of vision was formerly understood as a passive stretching caused by the contraction of the agonists which had to overcome the resistance of the antagonists. In consequence of this wrong supposition the ophthalmologists thought that the function of a paretic muscle might be improved by weakening the antagonists. But by doing this they only added a postoperative weakness of the antagonist to the paretic weakness of the agonist, without improving the function of the latter.

According to Hering's law every motor impulse flows equally to both eyes, causing the associated muscle groups to contract or relax, respectively. While bearing in mind that in the movements of the eyes one muscle never acts alone, we may speak of the external rectus as the abductor and of the internal rectus as the adductor, in order to simplify the following considerations. Both the external rectus of one eye and the internal rectus of the other eye are associated in bringing about parallel movements to the right and to the left. Their functions are not perfectly identical, and this is true of any other pair or group of muscles—for instance, of the right inferior rectus and the left superior oblique, both of which play the main part in turning the visual lines down and to the right.

But the functional inequality, becoming manifest only in the extreme periphery of the field of fixation where it would cause diplopia or blurred vision, does not matter since, in the normal act of vision, such extreme movements are avoided by compensating movements of the head. As a rule, the eyes are not moved more than 13 or 15 degrees in each direction from the center of the binocular field of fixation, so that normally the reaction of any associated pair of muscles to an equal innervation may be considered as producing equal effects in both eyes in the middle part of the field of fixation. But the external and internal recti do not act merely as abductor and adductor, respectively, in parallel or colateral movements. The same muscles have to perform contralateral, that is, convergent and divergent movements. While in colateral movements the external rectus of either eye works in association with the internal rectus of the other eye, in contralateral movements both the internal as well as both the external recti are associated, each pair being governed by one particular center; namely, for the convergent and divergent movement which is separated from the centers governing dextro- and levoversion. Analogous conditions exist in the vertical movements. Both pairs of elevator muscles are associated in producing parallel upward movements; besides, the elevator muscles of either eye are associated with the depressors of the other eye and are governed by the nervous centers for vertical divergence. The

power of an individual muscle is entirely different according to whether it is innervated by the center governing the parallel movement or by the center driving the two eyes in opposite directions. That is true not only for the muscles acting in those movements which are not governed by the will, as the lateral or vertical divergence, but also for the internal recti acting in parallel and in convergence movements, both of which are governed by the will. The range of adduction produced by the strongest convergence effort amounts to hardly half of that which the internal rectus can accomplish in parallel movements. This fact proves that one cannot determine the muscle power by testing the fusion movements. The fusional amplitude determines the efficiency of the innervation or of the center stimulated in the test.

Fusion movements play such an important part in the diagnosis and treatment of motor anomalies that they have to be discussed rather in detail. There are three pairs of fusion movements: convergence and divergence, positive and negative vertical divergence, and conclination and disclination. The only fusion movement which—at least to a certain extent—can be performed voluntarily, is that of convergence, because the latter is also a link in the mechanism of near vision, which is governed by the will. In people with normal binocular vision, all the other fusion movements take place only if the identical images are shifted from corresponding to disparate areas of the two retinas. This can be achieved either by means of prisms or, better, by means of the mirror haploscope (fig. 6).

In order to measure the amplitude of a certain fusion movement, for instance of positive vertical divergence, prisms of increasing strength are placed either base down before the right eye or base up before the left eye. The fixated object will be seen double, the image belonging to the right eye lying above that of the other, but if the prism is not too strong the double images will be fused after a moment. By replacing the weak prism with prisms of gradually increasing strength one may find that, for instance, a prism of 4^{Δ} base down before the right eye will cause insuperable vertical diplopia, whereas with a prism of 3^{Δ} the subject will still be able to see singly; that is, to overcome the prisms by an adequate vertical divergence innervation. But if the experiment is repeated immediately several times in succession, and the prism strength is increased very slowly, the person will be able to bear stronger prisms in the later experiments without seeing double, till at last it will be found that a prism of 6^{Δ} is the limit beyond which one cannot go without inducing insuperable vertical diplopia, however often the experiment may be repeated. The same prism of 6^{Δ} is also the strongest which the person can overcome if the prism immediately afterwards is put in the reversed position, base up, before the other (left) eye. As long as he has that prism before one eye, the subject is not able to overcome the weakest prism put in the reversed position before the other eye. This fact is to be explained only in one way: although one eye alone moves up or down behind the prism, both eyes are under the influence of an innervation to positive vertical divergence. At the same time an impulse to a parallel supra- or infraversion movement is brought into play in order to keep the position of the fixating eye unaltered by compensating the effect of the vertical divergence innervation in this eye, while enlarging correspondingly the movement of the fellow eye.

The most exact measurements of the amplitude of the different fusional movements are obtained by means of the hap-

loscope. The first thorough investigation of the fusional movements was carried out by my late friend, the physiologist F. B. Hofmann, and myself[1] in Ewald Hering's institute. What was ascertained in those investigations can be summarized as follows:

(1) Fusional movements cannot be produced voluntarily, nor do they take place involuntarily; they must be induced by adequate fusion stimuli. (2) They develop very gradually and increase during a series of successive tests up to a limit which cannot be passed even by exercises continued over a long period of time. However, the time required to attain the limit may be shortened considerably by training. (3) The fusion power varies not only among different persons but also in the same person, if the tests are made at different times. If the person is tired or his attention is not continually directed to the fixated objects, he will display only a fraction or next to nothing of the amount of the fusion range that will be obtained from him if he is rested and attentive. (4) A very important fact must be emphasized; namely, that the fusion innervation produced by adequate fusion stimuli does not relax immediately after stimulation has ceased. It decreases very slowly and a residue, manifesting itself as a corresponding phoria by suspending fusion, can be ascertained even after fusion stimuli producing the antagonistic fusion innervation, by which the eyes are brought into the normal position, have been applied. Taking this fact into consideration, we will understand the difficulties encountered in cases of heterophoria where we have to determine the position of rest.

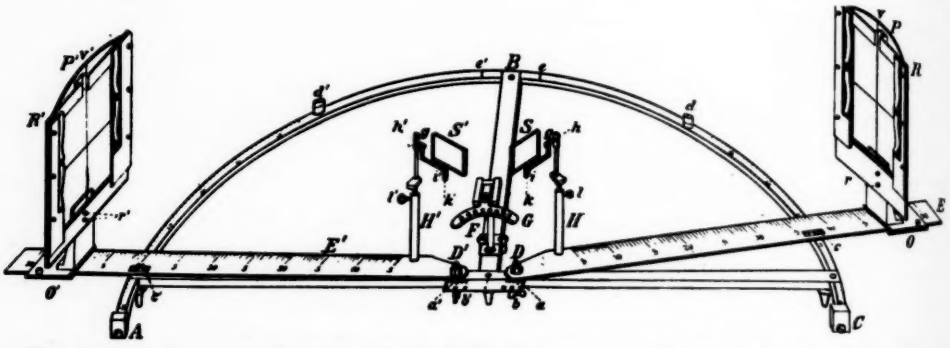


Fig. 6 (Bielschowsky). Hering's mirror haploscope. A person looking into the mirrors S and S′ at an angle of 45° to his visual lines, will see the targets R and R′ straight ahead, with his visual lines parallel if the haploscope arms E and E′ are in the zero position. By moving the arms in one direction or the other the eyes are stimulated to converge or diverge, provided there is fusion of the two targets. By raising one of the targets or rotating it about its center the eyes are stimulated for vertical divergence, or torsion movements, respectively.

The innervations previously discussed have to be derived from cortical centers. The voluntary and the commanded innervations arise in the centers located in the frontal lobe, whereas the other oculomotor centers situated in the occipital lobe respond, very likely, to sensorial, particularly to fusion stimuli; since, like the reflex movements, they arise almost automatically, they are to be located close to the visual centers in the posterior pole of the occipital cortex.

[1] Hofmann, F. B., and Bielschowsky, A. Ueber die der Willkür entzogenen Fusionsbewegungen der Augen. Pflüger's Arch. f. Physiol., 1900, v. 80, pp. 1-40.

SOME PROBLEMS ENCOUNTERED IN CATARACT SURGERY*

WATSON W. GAILEY, M.D.
Bloomington, Illinois

The preliminary studies in cataract surgery are fully as important as the operation itself. Before operating it is quite necessary that one should have at least some notion as to what the end result might be.

The methods now employed to determine in advance the amount of vision that might be expected after operation are not entirely reliable. It is, of course, important to know the degree of projection for both white and red in all fields. The following test for retinal integrity has been found to be quite reliable, except in cases of dense hypermature cataracts. Two small ophthalmoscopic lights are held one meter from the eye under examination. The patient is told to fixate on the one light directly ahead and is asked to locate the other light by pointing. The second light is moved into all portions of the field. This test passed successfully makes the surgeon confident of obtaining a good visual result after operation—except, of course, in cases of accidents or severe complications.

The history of poor vision before the onset of the cataract is reasonable proof of intraocular disease and indicates a poor prognosis for good vision. One must be on the alert in the preliminary study, for cataract frequently complicates glaucoma, detachment of the retina, and choroiditis. An illustration of the visual possibilities after cataract extraction in a case of internal strabismus with amblyopia ex anopsia in the squinting eye was observed in a 70-year-old man who had had an internal strabismus in the right eye since childhood. He also had a mature cataract in this eye, the left eye being similarly involved, with vision of 20/80. The patient disapproved having the mature cataract extracted, for he maintained that the vision in this eye had always been extremely poor. An intracapsular extraction, however, gave him a vision of 20/200 which very rapidly rose to 20/20 within a period of six months.

Any suggestion of uncompensated cardiac disease, chronic bronchitis, bronchiectasis, asthma, hypertrophy of the prostate, hemorrhoids, chronic constipation, high blood pressure, infected teeth, or diabetes should be thoroughly investigated and every effort made to rectify such conditions before the ocular operation is attempted. Inquiry concerning cough is important. Intraocular tension should *always* be taken. In the writer's opinion some calamitous cases in his early practice could be laid at the door of a glaucoma simplex which was not detected prior to operation.

Experience gained in India has led him to doubt the possibility of septic teeth having any bearing on inflammatory complications following cataract extraction. In hundreds of cases, in practically all of which there were septic mouths, no infections occurred. On the other hand, the patients may have had a high degree of resistance, or they may have attained a secure degree of immunity.

The writer has accepted 185 as the maximum safe systolic pressure for cataract surgery.

A complication that all ophthalmologists fear in hypertension is expulsive hemorrhage, or at least a serious late intraocular hemorrhage. Six expulsive hemorrhages have come into the writer's

* Read before the Chicago Ophthalmological Society, on December 20, 1937.

experience, three of them occurring in one morning five years ago in India; one, four years ago; and the last two have taken place since June of this year. Not a very pleasant record to reflect upon! In each instance, the blood pressure was low for the patient's age, well below 185. It has been estimated that the incidence of expulsive hemorrhage is one in one thousand operations.

In cases of extreme hypertension, the usual methods for reducing—such as rest in bed, the use of sedatives, and magnesium sulphate—are put into operation, and in cases resisting these measures, blood-letting is resorted to one hour before operation. Intraocular hypertension may perhaps be as great a factor in hemorrhage as arterial hypertension.

Studies with the slitlamp give considerable information concerning the condition of a cataractous lens and are worth while to the surgeon, particularly in the matter of planning which type of extraction shall be attempted.

Patients with diabetic-cataract and senile cataract with diabetes are hospitalized for preliminary study by an internist.

On account of the possibility of hemorrhage, Benedict suggests that since the use of insulin is conducive to hemorrhage, this medication be discontinued for at least four weeks before extraction is attempted. However, in checking over personal files it does not appear that there is a greater percentage of hemorrhages in patients who have been treated with insulin over those who have had sugar reduction by diet. Unquestionably, there is greater liability to postoperative iritis and iridocyclitis among diabetic patients regardless of the methods used in preparing the patient for extraction. A trace of albumin is not a contraindication for a cataract extraction.

Among cases that present technical surgical difficulties are those in which there is a very shallow anterior chamber. If patients of this character do not have intraocular hypertension, a Kuhnt flap should be made first, then a small section which is enlarged with scissors, and extraction of the lens by the capsulotomy method. Second, are the intumescent cataracts which probably would resist any and all efforts at extraction with capsule forceps. These are ideal cases for the use of the erisiphake, provided that the zonule is not too unyielding and that there is no posterior-segment bulging following section. The same may be said of the cataracts having the mother-of-pearl sheen. Third, the small eye is a difficult one on which to operate, but it will be found that rotating this type of eye outward with fixation on the internal rectus will make the section a much easier procedure.

Cases of high myopia with nuclear cataracts and nuclear cataracts with clear posterior cortex should be approached with great caution. They are very difficult to clear of cortical matter. In both of these types, a preliminary discission with extraction after 24 or 48 hours has yielded none too good results in the writer's hands.

The writer admits that the Wassermann test is not routine in his cataract practice. Clapp states that postoperative complications are more frequent in the presence of latent syphilis and that healing may be just as rapid in a person with syphilis as in a normal person free from all complications.

The lacrimal sac, if infected, presents a problem which must be dealt with effectively—by excision.

The question of bacterial cultures arises at this point in the discussion. Prior to 1930, cultures were the rule in the writer's practice. Having followed all the rules of procedure in a rather limited practice, he grew to expect an infection

every two years. Since 1930, he has discarded preoperative bacterial tests and has been so fortunate as to escape without a single exogenous infection. At about the time bacterial cultures were discontinued, preliminary scrubbing of the skin and irrigation of the conjunctival sac were also discarded, and the question arises as to which of these two changes has been responsible for this freedom from infection. Since he is not sure, the writer will make no further changes in this technique, much as he likes to experiment. It should be added, however, that the use of the face mask and rubber gloves has been routine in his surgery since that time, and may, perhaps, account for this excellent record.

The next problem facing the surgeon is as to the period in the development of a senile cataract when the patient should be advised that an extraction is indicated. There can be no cut-and-dried ruling, for one must consider the age, visual acuity, physical status, prejudices, and the occupation of his patient before determining this point. It is a rule with the writer to refrain from advising an operation until that time when the patient is thoroughly unhappy over his plight regardless of the amount of his vision. It is said that a vision of 20/70 or worse is sufficient excuse for advising cataract extraction. The unhappiness of the patient is a better standard. For instance, if the bookworm can no longer read, or if the worker finds he cannot do his work with any degree of satisfaction to himself or employer, then it is high time that he should be advised to resort to surgery.

What should be done toward preparing the patient for operation? Attention, of course, is given to the lacrimal passages. Some surgeons employ foreign proteins several days prior to the operation. Typhoid H antigen has been given by some who think it is worth while. Cleansing of the conjunctiva and the use of antiseptics several days prior to operation is the routine of a great many surgeons. The writer's only preparation is a pad of cotton saturated with an acridine dye kept on the eye twelve hours before operation. No preoperative purgatives of any kind are administered.

Adequate measures are taken to control a chronic cough. Nervousness of varying degree is controlled by proper medication, and nembutal and luminal have been found to give the best results. Under no circumstances is morphine used. Incidentally, it is a great help in many cases to employ nembutal for as long as one week after the operation has been performed. The various drugs used for dilatation of the pupil prior to operation are scopolamine, euphthalmine, homatropine, and atropine. Having tried them all, the writer favors euphthalmine —a 5-percent solution, 1 drop every fifteen minutes for four instillations; the first drop to be given two hours before the operation is scheduled.

It is well to know before sending the patient to the hospital whether or not the pupil can be dilated successfully, and no better drug than euphthalmine has been found, to determine the presence of iris rigidity or posterior synechiae.

At what age should the intracapsular operation be supplanted by the extracapsular method? The majority of surgeons do not attempt an intracapsular extraction in patients under 50 years of age. It is surprising to find that many patients under that age have friable zonules that permit of rather easy intracapsular delivery. On the other hand, it is equally surprising to find that in many over sixty years of age zonular resistance has been great. Hence the rule has been followed to attempt (with care) to extract intracapsularly all lenses in patients over forty years of age.

The selection of cases for intracapsular or extracapsular extraction is based upon the principle of considering all cases as suitable for intracapsular extraction with the exception of: those complicated by high blood pressure or extreme excitability in the patient; asthmatic patients with chronic cough; those having enlarged prostates, rigid pupils, highly myopic eyes, bulging eyes, glaucoma, and lastly those with morgagnian cataracts.

Intumescent lenses or smooth capsules offer no contraindication to intracapsular extraction, for the erisiphake can be used successfully in these types.

Nor should a one-eyed patient fall into the extracapsular class if there are no other contraindications. If a one-eyed patient is not proper material for intracapsular extraction, the operation should be discarded.

Success in using the extracapsular method in eyes which have suffered old inflammation, such as recurrent iritis with adhesions, have not been very great in number; but such cases have been successfully handled as a whole when an intracapsular extraction has been performed.

Certain conditions present in each individual case determine the method of surgical attack, but even so the right to change the method is reserved after the section is made. In other words, the ophthalmic surgeon should approach every case with an absolutely open mind and be prepared to shift his attack as the occasion demands. For instance, one may feel that the case in hand is ideal for the performance of an intracapsular extraction with a round pupil as an end result. However, after the section is made, one may find a thrusting forward of the posterior segment, the patient may be nervous, or there may be a tense smooth capsule which was not in evidence in the preliminary examination, or a small, round, rigid pupil. Any one of these conditions may serve as an indication for a change of method.

According to Wright, the preparation of the field of operation is largely a pose, and this writer is inclined to agree with him. Provided the lashes are clean and the conjunctiva contains no visible secretion, it is rather useless and perhaps harmful to scrub the skin and lashes and to irrigate the conjunctival sac.

To paint the skin of the forehead, lids, cheek, and temple with a solution of metaphen, may be somewhat of an affectation. It is important, however, to be sure that the instruments used within the eye are not contaminated by touching the skin or lashes. It is probable that a great many of the old cases of panophthalmitis had their origin in the failure to protect the eye being operated on from the respiratory blasts of the operator, assistant, and patient.

The use of rubber gloves in cataract surgery is a step forward in intraocular surgery.

Great progress has been made in the last few years in the matter of anesthesia preparatory to eye surgery. The writer's method has been to use cocaine—4 percent every two minutes for six instillations—care being taken to compress the lacrimal sac, thereby preventing the solution from seeping through into the nasopharynx. This occurrence might reasonably be suspected as a possible cause of postoperative nausea and vomiting. After the last drop of cocaine has been instilled the O'Brien method of akinesia is employed. Very few failures have been experienced with this method, but when they do occur, recourse may be had to the Van Lint procedure. Retrobulbar anesthesia is employed, 2 c.c. of 4-percent novocaine solution being used. The injection is made in the lower cul-de-sac, hugging the eyeball closely, making the

injection into the cone anteriorly—thus avoiding the entrance point of the retinal artery. This method of injection is of importance, for one is less likely to injure one of the orbital vessels.

One reads of retrobulbar hemorrhages, but this complication may be avoided by using the technique advocated by Harvey Cushing in his brain surgery—namely, to inject very slowly ahead of the advance of the tip of the needle. This procedure has been followed for years and not a single case of retrobulbar hemorrhage has been encountered; which, after all, proves nothing.

Eight minutes are allowed to elapse before the introduction of the speculum. A superior-rectus suture is used in all cases, care being taken to get firmly into the muscle and not to include a large fold of conjunctiva.

Several instillations of adrenalin have always been given just before making the section and the thought has recently presented itself that the use of this drug may encourage secondary hemorrhage into the anterior chamber. It is said that the normal iris does not bleed.

One or two drops of adrenalin have been injected subconjunctivally at the 6-o'clock position for the purpose of maintaining dilation after the section has been made. The procedure has been helpful but by no means infallible.

Fixation may be made at the 6-o'clock position or slightly below the point of intended counterpuncture with either conjunctival or scleral fixation forceps. All manner of forceps, both single and double, have been used, but a fine-toothed scleral fixation forceps such as Elschnig's or O'Brien's, when properly applied has given the best results. One should be thoroughly convinced that the scleral fixation forceps will maintain its grip before the puncture is made, for there is nothing more exasperating than inadequate fixation. Fixation forceps should be given the same affectionate care that one gives to his knives.

Much has been said about the nervous or jittery patient, but very little is said about the jittery surgeon. If the same-sized dose of nembutal were administered to the surgeon as to the patient, many cataract extractions might prove to be calmer procedures.

Control of the eye in case of a conjunctival tear or failure at fixation may be maintained by grasping the superior-rectus muscle with fixation forceps and completing the incision. This procedure, however, is a very difficult one, and about the time one becomes proficient in the technique, he finds he has no further use for this method.

The incision in the bulging eye is an easy procedure, but one approaches this type of eye with considerable misgiving as to what will follow the incision. The deep-set eye is another type, and a canthotomy may well be performed in all of these cases, for it makes the section so much easier.

In the making of sections, one of the greatest errors is in making the counterpuncture too deep, and to avoid this complication the tip of the knife should not be allowed to disappear from view before making the counterpuncture. When premature loss of aqueous from the anterior chamber occurs, leaving a flat eye with the iris in position to be fouled, one of several procedures may be followed. If the incision is well on its way, it is wise to withdraw and finish with the scissors. A second measure is to withdraw and refill the anterior chamber, select a smaller knife, and proceed with the section. A third method which has been employed successfully, is to fill the anterior chamber with the knife blade still in position, by having the assistant apply the tip of the irrigator to the flat surface of the

blade, and refill before proceeding with the section. In case the knife is inserted upside down, the blade should be withdrawn, the anterior chamber refilled, and the section then finished with a smaller blade.

For good healing, a proper conjunctival flap is paramount. A small flap is fully as good as, or better than, a large one, and there is much less likelihood of a complicating hemorrhage. A 2-mm. flap laterally, and a 3- or 4-mm. flap at the apex is quite ideal, but is not always obtainable.

Blood in the anterior chamber following section is not a serious complication; it can be dealt with by the simple method of irrigation. Seldom does one encounter hemorrhage that can not be controlled, even in diabetics. At any rate, one must be sure that the anterior chamber is clear before introducing the capsule forceps.

The immediate presentation of vitreous following the completion of the section is a complication that requires instant calm action. The writer's procedure has been first to lift the speculum carefully and remove it as gingerly as possible; next, to apply a conjunctival suture or two; and lastly, with the careful use of a wire loop, to extract the lens—and then say a prayer.

No method known to the writer will counteract the contraction of the pupil which occasionally follows the emptying of the anterior chamber after the section is made.

Among ophthalmic surgeons there are advocates of full iridectomy, iridotomy, double iridotomy, peripheral iridectomy, and double peripheral iridectomy. In addition there are those who advise making the iridectomy after the lens has been delivered. A small peripheral iridectomy, either single or double, before extraction of the lens is advocated.

As to sutures, any suture is better than none. Conjunctival sutures, even six or seven, are inadequate. It would seem that closure of the deep wound is the proper solution. Various types of corneoscleral sutures have been tried, but none has been found that is easy of application and at all times pleasing. The difficulty may be in not adhering to one technique long enough to grow really proficient in it. A firm, secure corneoscleral suture properly applied—a peripheral iridectomy—really peripheral—and followed by injection of an air bubble into the anterior chamber, should avoid prolapse of the iris in many instances. It might not be amiss, at this point, to make the observation that prolapse of the iris is not confined to the round-pupil cases. Perhaps the prolapses occurring in full iridectomy extractions do not prove to be so annoying as those which complicate round-pupil operations, but they seem to occur all too frequently. This makes the supposition almost a certainty that the sudden release of aqueous is responsible for many prolapses. Prolapse of the iris immediately following the section is annoying, particularly so if one's efforts at repositioning prove futile. A single or double peripheral iridectomy at this stage often relieves this tense situation. This complication is indicative of a moderate thrusting forward of the posterior segment and the surgeon is wise if he is on the alert, for vitreous presentation is quite prone to follow extraction.

In cases of late prolapse of the iris attempts to replace an iris with a curved spatula slid under the conjunctival flap have been anything but satisfactory. Some authors report having obtained good results by employing this procedure followed by the use of eserine. Perhaps the poor results were due to selecting the wrong time or perhaps the technique was at fault.

The problem of prolapse of the iris is not so often *how* it should be repaired but *when* it should be given attention. Unfortunately, prolapses seem to grow in size and bulbousness as time elapses. Despite this, the writer's best results in repair have been accomplished after the eye is white. It may be that this involves too much waiting. For the larger variety a Kuhnt flap is dissected back, the prolapse excised, the wound touched lightly with a cautery point and closed with this conjunctival flap. For the small knuckles, very good results have been obtained by using the late Dr. Harold Gifford's trichloracetic cauterization procedure. This method is painless if one waits until the sclera is white. It may be queried whether the desire to secure a round pupil is not for the purpose of tickling surgical vanity rather than to exclude excessive light; to make pretty eyes at the risk of occasioning the patient some distress and perhaps delivering to him an eye not so useful as it might have been.

A rigid pupil may be found to be caused by an atrophic iris or by a complete posterior synechia of the pupillary border or again by a mid-peripheral adhesion of the iris to the lens. In these cases it is well to perform a full iridectomy and to follow this with a very careful separation of the iris from the lens with a thin spatula. If the pupil is found to be free and rigid because only of its atrophic state, dividing the iris with a blunt deWecker scissors at the 6-o'clock position has proved a method which permitted successful delivery.

As to the application of the capsule forceps, it is well to grasp the lens as low down as possible. Just how much capsule bite to take is a question for the individual operator to decide for himself in each case. Either too large or too small a bite is conducive to rupture of the capsule. Capsule forceps require as tender care as do fixation forceps. As to how much pull and how much push there should be in intracapsular extraction, these factors must also be determined at the time of operation by gauging the amount of resistance encountered. The writer employs much pushing and very little pulling; that is, using the grasp on the lens as a leader and his strabismus hook as a pusher, he simply guides the lens in its tumbling process upward and outward. Tearing of the capsule, of course, complicates matters, and it is a great comfort to have a Fisher needle at hand ready to spear the lens in case this complication should occur.

It is a good rule in both extracapsular and intracapsular attempts if the capsule is ruptured to inspect carefully the angles of the wound for any signs of capsule remains. Irrigation is very valuable in removing cortical remnants and the Hildreth lamp, clumsy as it is to manipulate, is of great help in determining the presence of cortical matter and tags of capsule. The writer has never had the temerity to enter the anterior chamber with forceps for the purpose of removing fragments of cortex.

In performing an extracapsular cataract extraction, there can be no argument concerning the use of the multiple sharp-toothed capsule forceps, care being taken to remove as large a segment of the anterior capsule as is possible in order to leave a large central gap.

In the intumescent type of cataract an erisiphake may be used, if after the section is made there are no signs of pushing forward of the posterior segment.

Incidentally, Dr. Barraquer told the writer a number of years ago that one of the dangers often spoken of in connection with the extraction of the cataractous lens by the erisiphake was the possibility of sucking up the entire liquid content of the globe. This, he explained,

was impossible if the corneal flap was turned back and if a cotton-wound applicator was applied to the anterior surface of the lens in order to determine the presence of vitreous; if there was no vitreous present, the extraction of the lens with the erisiphake was without danger.

An eye having a shallow anterior chamber may show a slight increase in tension—perhaps only a relative one—in which case it is well to perform a decompression operation first or a capsulotomy operation with a broad deep iridectomy.

A cataract extraction in an eye that has previously been trephined should hold no fears for the surgeon. Proceed regularly, performing a broad iridectomy. It is not necessary to make elaborate conjunctival flaps and no serious complications have ensued in these cases.

Some surgeons speak of a collapsed cornea following section as they would of a calamity. This state often follows a well-made retrobulbar injection. This occurrence seems to the writer to be a rather happy one when it does take place in his practice.

Immediate needling of the posterior capsule after extraction is a practice to be deplored, for it permits a herniation of the vitreous body into the anterior chamber.

Particularly in diabetics, slow restoration of the anterior chamber is not uncommon. This complication may be attributed to a jagged incision or to a poorly coapted wound or perhaps to fragments of the capsule lying in either angle. In several cases which persisted beyond the tenth day removal of the bandage brought about immediate filling of the chamber with aqueous.

Unquestionably diabetics are more liable to hemorrhage, and it is equally true that a section made with a large conjunctival flap or bridge may be complicated by excessive bleeding. Adrenalin should be employed sparingly in preparation for cataract extraction, for it is reasonable to assume that it might be a factor in the etiology of postoperative hemorrhage. Most secondary hemorrhages occur on the fifth day. Just why they select this day to appear, is not clear. The use of the bedpan might be suspected as the cause of some secondary hemorrhages as well as of a great many cases of iris prolapse. Great stress has been laid on the avoidance of any strain or exertion of any kind such as turning in bed. Great importance has been given the proper posture of the patient who has undergone cataract extraction. The posture fear, is probably overdone, and patients in the writer's practice are being given more and more liberty. At least the majority of us have graduated from fixing the head with sand bags. On two occasions, however, it has been seriously regretted that the patient's hands were not tied during sleeping hours.

A great many remedies are recommended to hasten the absorption of a small amount of blood in the anterior chamber, all of which have been tried from time to time; in recent years, however, it has seemed better to refrain from any of these hastening methods, for it has been found that blood will become absorbed without help. Why irritate the patient with dionin, heat, or other remedies when absorption will occur in practically all instances regardless of treatment?

If the hemorrhage is of such amount that one is worried as to the possibility of ultimate absorption, it is best to open the chamber, irrigate, or remove the clot with forceps. In early cases, dionin is not used because of the possibility of making the patient sneeze.

It is rather distressing when one finds that a quiet hemorrhage into the pos-

terior segment has occurred during convalescence. This complication, in the writer's practice, has terminated some times well and some times disastrously.

It is doubtful whether benefits are derived from subconjunctival injection of normal salt solution and the use of dionin, but they are nevertheless always employed empirically. Just how beneficial they are, it is not easy to say, but it is felt that some measures to promote absorption should be used whether or not there is proof of their efficacy. Diathermy has been used by some surgeons and, it is claimed, with good effect.

The use of eserine in extracapsular cataract extraction is somewhat on the order of jumping out of the pathway of a bicycle to be hit by a tank, for when eserine is used after round-pupil, extracapsular extraction there may follow entanglement of the iris in cortical matter, and it may become quite difficult to dilate the pupil should an iritis ensue.

In his practice the writer has never experienced vomiting by the patient at the time of operation. In recent months, if nausea occurs following operation, even though it be of the slightest degree, ten drops of dilute hydrochloric acid are given on the assumption that most elderly people are afflicted with hypochlorhydria. This controls nausea with astonishing effectiveness.

Surgeons differ widely as to how often the operated-on eye should be dressed. After many trials of different procedures, it has been found that the patient is not harmed and that the surgeon is in better position to detect complicating disturbances early, to say nothing of maintaining peace of mind, if he makes daily dressings.

It has been some years since the writer has had a case of postoperative mania. This might be explained by the fact that he does not bandage the unoperated-on eye for more than 24 hours and quite recently he has graduated to the point where no covering is made on the unoperated-on eye from the very beginning.

Pain in the operated-on eye is fortunately not a frequent symptom, but when it does occur, it is, in most instances, inexplicable. Pain, however, does warrant inspection. If nothing serious is found at this time, empirin compound usually affords immediate relief.

Backache has been a more frequent symptom than eyeache. This condition occurs more frequently among females, because they are swaybacked and the relaxation that occurs under sedatives on a hard operating table tends to produce neuralgic symptoms in the muscles of the lumbar region. This discomfort is often avoided by furnishing an adequate support both on the operating table and after the patient is returned to bed. Backache is often caused by an accumulation of gas in the lower bowel. Local heat and massage are usually effective, but it is often necessary to resort to a colon tube if there is distension as well.

Atropine is an invaluable drug, but like all good things its application is sometimes overdone. Careful postoperative administration of this drug is invaluable, but one should be cautious to use no more than is absolutely necessary. If one is desirous of having a dilated pupil, gauge carefully the strength and amount of the solution or ointment to be used, for it is only too easy to render the patient hypersensitive to this drug, which in itself is a most undesirable complication.

The novocaine-tumor problem may be dismissed with the statement that these are caused by the use of old solutions and that they seldom require removal.

Spastic entropion following cataract extraction is an annoying occurrence. When it does happen, it is well to resort immediately to the Zeigler method of

cauterizing the lower lid. This complication is quite prone to produce other more disastrous ones.

Postoperative iritis and iridocyclitis are disturbing complications. Intravenous injections of typhoid paratyphoid A and B mixed vaccine give the surgeon a measurable foreign protein.

The Cordes method has been used, of giving five million the first day, seven the second, nine on the third, and ten on the fourth. Some authors advise starting with 25 million, but the dosages described by Cordes are very effective. Large doses of salicylates are used routinely in these cases.

The relief of postoperative detachment of the retina has not been good in the writer's hands. Tears were located in most of the cases, but efforts at repair have been fruitless.

How long to keep the eye covered and protected by a shield is sometimes very difficult to determine. The difference in opinion on this point among eye surgeons is great. It has been found comforting to continue dressings through the fourteenth day and to continue the wearing of the Fox aluminum shield at night for an additional week.

The writer has had no experience in performing early needlings, for he has always preferred to wait for a white eye. As to the best methods to employ, this should depend upon the type of case at hand, but in any instance the surgeon should use the method or methods giving him the best results. For very dense membranes, a keratome may be employed to open the globe and a Noyes scissors for dividing the membrane. For the less dense membrane—but tough, notwithstanding—the Duggan method is effective; for thin membrane, the ordinary classic method of discission, using a knife needle. In all cases there should be as little trauma as possible, and dragging on the iris or ciliary body must be avoided. For this reason, the Duggan method of discission is preferred; particularly in those cases in which it is probable that more than average resistance will be encountered to efforts at splitting the membrane.

Aftercataracts of the inflammatory type should be given plenty of time to grow quiet and white before discission is attempted.

Postoperative glaucoma occurs all too frequently and one should be continually on the look-out for this complication. It should be the first thing to come to mind in any case in which there is loss of vision. For the correction of this type of ocular hypertension, better results have been secured with cyclodialysis than with any other procedure.

The writer has set the tenth day as an arbitrary time for his cataract patients to go home, yet he has never outgrown the dread of seeing them go home on the tenth day, particularly so, if the eye is not white.

Even though we are provided with all modern methods, problems seem to lurk at every twist and turn of the surgeon's pathway and serious complications occur all too frequently.

A FURTHER REPORT ON THE SETON OPERATION IN GLAUCOMA*

MARVIN J. BLAESS, M.D.
Detroit, Mich.

In February, 1936, in the discussion of a paper[1] on the results of the surgery of glaucoma before the Chicago Ophthalmological Society, attention was called to the possibility of using a new modification of Zorab's seton operation.[2] Six cases of glaucoma in which the operation had been performed were reviewed at that time, and a preliminary report[3] was subsequently published in the American Journal of Ophthalmology.

Since the publication of this initial report it has been possible to follow further some of the original cases and to observe the results in a large enough series of additional cases to enable the surgeons using this technique to get a much more accurate opinion regarding the value and application of this operation, to note the types of glaucomatous eyes to which the operation is most adaptable, and to observe what complications are particularly to be avoided and what precautions are to be taken in performing the operation. The actual technique has already been described in detail, its repetition here is therefore unnecessary. The essential features are illustrated in figure 1, reproduced from the original report.

Thus far the operation has been reserved for cases of: (1) advanced glaucoma in which only light perception remains in a small eccentric field; (2) absolute glaucoma; (3) glaucoma in aphakic eyes; and (4) secondary and recurrent glaucoma in eyes that have previously been operated on one or more times. The technique entails a minimal interference with, and alteration of, normal structural anatomy of the eye.

In view of this restrictive selection of patients, brilliant visual results are not to be expected. All that is anticipated is retention of the eyeball, without any change in its appearance, and permanent control of the high intraocular tension

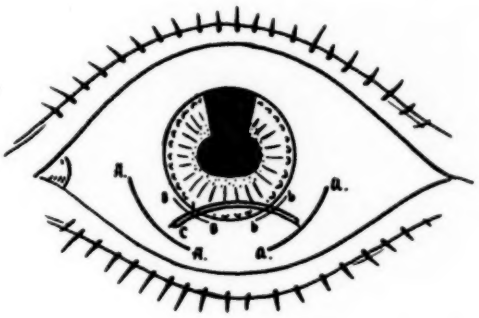


Fig. 1 (Blaess). The modified seton operation. A-A and a-a, conjunctival incisions; B-B and b-b, scleral incisions; C, seton in position under cornea and conjunctiva.

with relief from its attendant symptoms of headache and pain and aching in the eyes. These symptoms can definitely be relieved by a single seton operation which will produce results sufficiently reliable that the patient can be assured that one glaucoma operation on his eye is all that will be necessary to relieve the distressing symptoms and yet retain the eyeballs. This is an achievement that no other known surgical procedure for advanced glaucoma has yet made efficient and practical.

The question of what practical results may be expected from any type of surgical treatment for glaucoma is one that is continually arising and one that every ophthalmic surgeon repeatedly encounters. It is perhaps due to the avidity with which the average layman reads popular, distorted, and inaccurate accounts of

*Presented before the Eye Section of the Seventh Cruise Congress of the Pan American Medical Association, January 1938.

what surgery can accomplish, that he has been led to place unwarranted confidence in his own vague and exalted conceptions of modern surgical attainment. Therefore, in proposing any operative treatment it is only fair to the patient that he be honestly apprised of what results may be expected. In view of the carefully compiled and published statistics on the results of the various commonly used surgical methods of treating all types of glaucoma, one was not formerly justified in giving any patient the absolute assurance that any known operation was all that would be surgically necessary to cure or control advanced glaucoma. And yet the practical result to the patient was, and still is, the all-important factor in determining the use of any surgical treatment. It was with these fundamental facts in mind, coupled with an intense desire to have available a simple and easy method for controlling any secondary or postoperative rises in tension that might occur, that the seton operation was revived and revised.

In presenting the results of over three years of observations and experience in the use of this method of controlling obstinate cases of advanced glaucoma, it may be well to emphasize again that the type of eye in which this operation was utilized was one enfeebled by previous surgical intervention, emaciated by disease, and generally conceded a poor surgical risk for any additional operative trauma. In almost every case the eye was blind, painful, and often long neglected. Usually enucleation had already been advised, and frequently the patient was in the act of pathetically consulting one surgeon after another in the hope of avoiding this procedure. In all but four cases the eye selected for the seton technique had already been subjected to one or more surgical operations. The aim of the seton operation was merely to enable the patient to keep the eyeball and to make its retention permanently comfortable and symptom free with a single operation. Therefore, if the eye healed, remained quiet, and produced no distressing symptoms, the result was regarded as successful.

Sixteen eyes have been operated on by the writer, and the results in 14 other eyes have been carefully observed. Out of these 30 cases, 26 eyes have remained quiet, comfortable, and symptom free. Of the three eyes which required subsequent enucleation the loss cannot be attributed to any particular failure on the part of the operative technique—one required removal because of a choroidal tumor; one, due to a persistent and painful postoperative endophthalmitis; and one, due to an expulsive choroidal hemorrhage. One eye recovered nicely from the seton operation but suffered a choroidal hemorrhage later when an attempt was made to remove the cataractous lens. These are complications which may attend any intraocular operation and therefore cannot be attributed to the seton technique. In not a single case was an eye enucleated because of persistent and painful hypertension. When we consider the facts that we are dealing with condemned eyes and that the objective we are trying to attain amounts to no more than a salvage of the eyeball, the results are eminently satisfactory. In every eye except the three which required enucleation for the conditions already enumerated, the results were successful; that is, the eyeball was retained and did not again produce distressing symptoms.

If the incidence of immediate postoperative complications seems rather high one should recall the type of eye which was selected for the seton technique.

In several cases the intraocular tension again became moderately elevated after the seton operation but in no case did it

rise sufficiently to produce symptoms. Noteworthy are the facts that no eye in which a seton was placed has required enucleation because of persistent or recurrent glaucoma. There have been no late postoperative infections. In the case of every eye which healed without any immediate postoperative complication the symptoms have been relieved, and in no case has any additional surgical procedure been necessary for the relief of painful glaucoma. In all of these cases the setons are still in position after variable periods of time up to three years.

From the standpoint of the patient, the practical results of the operation are entirely satisfactory. In every case in which the globe was retained, a single seton operation has permanently relieved the symptoms and enabled the patient to keep his own eyeballs.

From the most exacting surgical standards the operation seems to have more than fulfilled our highest expectations. Although it is not an operation that has yet produced inestimable benefits in all types of glaucoma, the seton operation has proved itself worthy of important consideration in the type of case for which it was advocated and in other selected cases where the prime objectives are the relief of pain, the preservation of the eyeball, and the avoidance of the probability of repeated operations on a useless eye. The patient can be assured that a single operation will bring relief by reducing the tension to a degree that eliminates all distressing symptoms, and will permit permanent control of any recurrent intraocular hypertension by subsequent subconjunctival manipulation of the seton under local anesthesia or simply by digital massage of the eyeball. As a matter of fact I have found, after teaching patients to massage their eyes daily, that there is very little necessity for manipulating the seton with a forceps through the conjunctiva.

Considerable emphasis should be placed upon the importance of properly selecting cases for the seton technique, and of keeping in mind the basic objectives in order that the specific benefits may be obtained.

Case reports

Figure 2 shows the left eye of a lady of 72 years who for 35 years suffered

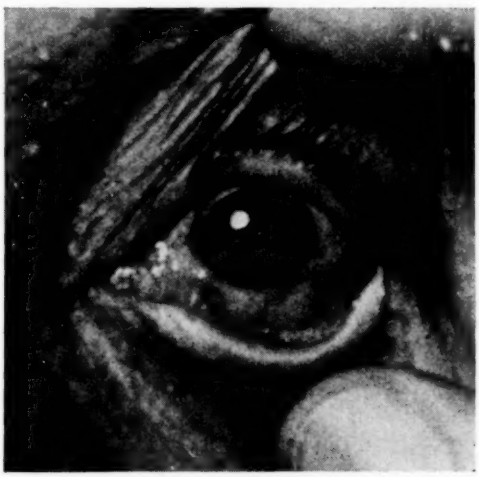


Fig. 2 (Blaess). Secondary glaucoma controlled for 14 months by seton.

chronic arthritis and chronic recurrent iridocyclitis; eventually developing cataract, iris bombé, and secondary glaucoma. After a combined intracapsular removal of the cataract by the Barraquer technique, a low-grade iridocyclitis and a pupillary membrane developed, and secondary glaucoma persisted until the seton operation was employed. The photograph was taken 14 months after the seton operation and shows the seton still in place. The intraocular tension is 20 mm. Hg (Gradle-Schiötz), and the eye is quiet and comfortable.

Figure 3 is a photograph of the right eye of a young woman 32 years old. When first seen this patient's right eye had

already developed absolute glaucoma. There was no light perception and the intraocular tension was 105 mm. Hg (McLean). At the time this photo was taken the seton had been in the eye for 14 months. Since the operation the intraocular tension has never registered more than 20 mm. Hg (Gradle-Schiötz).

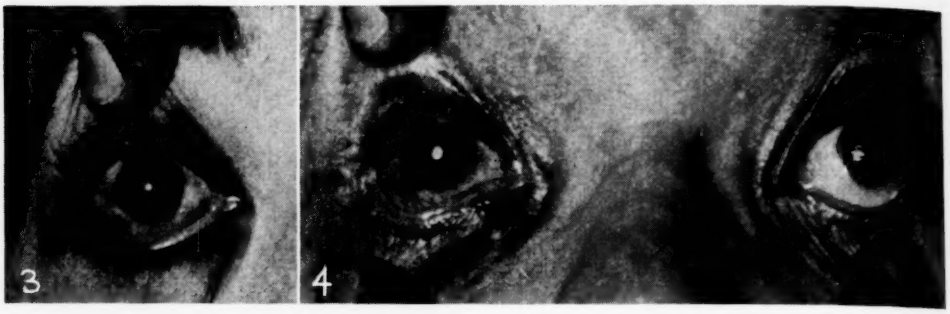
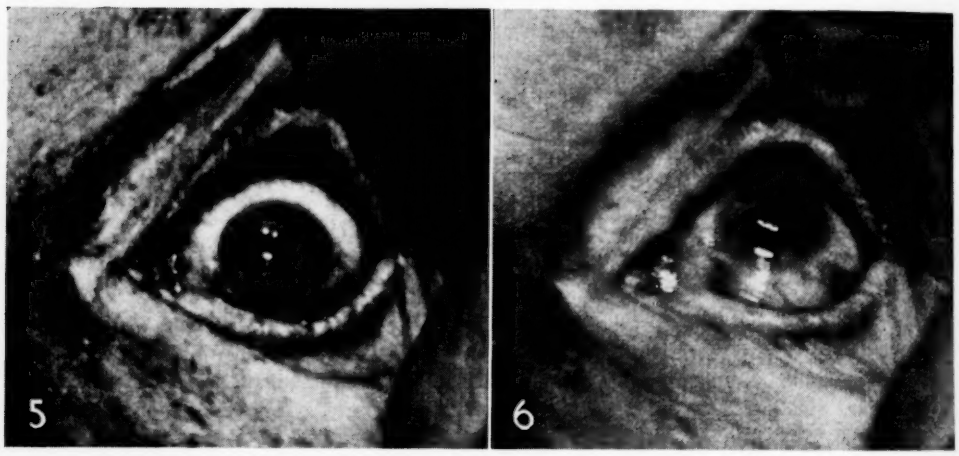


Fig. 3 (Blaess). Absolute glaucoma with tension of 105 mm. (McLean) relieved by seton; 14 months.
Fig. 4 (Blaess). Advanced glaucoma in both eyes. Left seton in place three months; right, two years.



Figs. 5 and 6 (Blaess). Glaucomatous eye two weeks after seton operation.

Figure 4 shows both eyes of a 67-year-old woman, with far-advanced bilateral glaucoma. Both eyes have setons in them. The left eye had had an iridectomy, and the right eye a combined extracapsular cataract operation and a discission previous to the seton operations. Both fundi are distinctly visible and show marked cupping of the discs and advanced glaucomatous atrophy. Vision in the right eye is 8/200 and in the left eye light perception temporally. The right seton has been in place for three months and the left seton for two years.

Figures 5 and 6 illustrate the left eye of a farmer 55 years of age, with chronic recurrent glaucoma. These photographs were taken two-and-one-half weeks after a seton operation had been performed. Trephining operations had been performed on both eyes one year previously,

without complication. Glaucoma recurred in only the left eye, and at the time the seton operation was performed the vision in this eye was restricted to the ability to count fingers at two feet, and its visual field was contracted in all meridians to within 10 degrees of the point of fixation, with a 5-mm. white spherical test object. The seton has now been in place for over 21 months and the intraocular tension has remained within the normal range. The eye is pale and quiet, and the residual vision and visual field have been maintained.

A recent review of the results of the surgery in glaucoma in 134 operations at the University of Chicago Eye Clinic[4] indicates that the trephining operation is still the operation of choice in glaucoma simplex. In a review of glaucoma cases at the Wills Hospital over a 10-year period Lehrfeld and Reber[5] also concluded that the Elliot operation has comparatively the highest efficiency in simple glaucoma.

The results thus far obtained with the seton operation do not yet warrant any revision of these conclusions. However, it should be pointed out that results obtained in eyes with far-advanced glaucoma that were previously slated for enucleation, and were conceded to be among the poorest of surgical risks, indicate that the eye will tolerate the type of surgical intervention represented by the seton technique. Judging from the results obtainable in eyes least suited to any surgical intervention it is reasonable to presume that even better results might be obtainable in eyes in the earlier stages of glaucoma.

It has indeed been gratifying to the writer to note the interest displayed in this new seton technique and to learn of the increasing number of surgeons who are making use of it. Experience is pointing out the necessary precautions and the complications of which to beware.

In the first place the question of intraocular tumor cannot be ignored. In one of my earliest cases the eye was stony hard, the sclera beefy red, and the corneal epithelium completely clouded and irregularly erroded by the bursting and sloughing-off of large blebs. It was impossible to see any intraocular structure. A seton operation was performed. The condition of the eye rapidly improved. The tension declined to normal, and the cornea became clear and epithelized. Examination now revealed a large intraocular tumor in the vitreous chamber. Microscopic examination after enucleation showed it to be a mixed choroidal sarcoma.

Extreme care must be taken in inserting the seton, for it is possible by improper manipulation to lacerate the lens capsule or to dislocate the lens. It is also possible to tear the iris from its roots, producing a partial iridodialysis and hemorrhage by too hastily forcing the seton through a collapsed anterior chamber. I have observed the occurrence of each of these operative complications.

In a few early cases one or both ends of the seton eroded through the conjunctiva, producing a fistulous tract between the aqueous chamber and the conjunctival sac. The best way to avoid this annoying complication is to place the seton deep under the subconjunctival tissues, directly upon the sclera, in a position corresponding as nearly as possible to the palpebral fissure. This is best accomplished by distending the subconjunctival space with an injection of normal saline before making the pocket flaps. After the curved conjunctival incision has been made concentric with the limbus, a thick flap can be easily made by blunt dissection with the scissors. This flap should include the conjunctiva and the entire thickness of the subconjunctival and epi-

scleral tissues down to the smooth, white, glistening surface of the sclera.

In several cases the seton operation has been combined with a Holth sclerectomy and with various types of iris incisions and inclusions. These added surgical maneuvers have occasionally produced hemorrhages and retarded healing; and the results obtained in eyes in which the seton technique was not embellished by these additional procedures were equally good. If one does not lose sight of its limitations, the seton operation will stand entirely on its own merits.

Summary and Conclusions

In a previously published account[3] of the use of a new modification of the seton operation in glaucoma, it was pointed out that in a high percentage of cases the usual operative procedures for glaucoma fail to control permanently the increased intraocular tension. In order to avoid the necessity of repeated operations, the use of the seton operation was advocated, so that the simple subconjunctival manipulation of the seton could be substituted for additional operative procedures when secondary rises of tension occurred.

The results of 30 seton operations performed over a period of more than three years indicate that excellent results may be obtained in eyes affected with far-advanced glaucoma. The author is unable to recall any other known operation for absolute glaucoma, and for far-advanced and recurrent glaucoma in which there is yet the possibility of saving or improving vision, that offers a greater reliability and permanency of results than is obtainable with the seton technique. In view of these gratifying results in selected eyes which represent the poorest possible prospects for any type of intraocular surgery, it may be presumed that the seton operation also offers the possibility for satisfactory results in eyes better suited to withstand surgical intervention in the earlier stages of glaucoma.

2407 Book Tower.

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DIET AND VITAMINS IN RELATION TO CATARACT*

ARTHUR M. YUDKIN, M.D.
New Haven, Connecticut

It is almost three centuries since François Quarre taught that a cataract was a turbidity of the lens and not a morbid fluid settled behind the iris. This observation remained dormant until the beginning of the 18th century, when Brisseau showed that a cataract was in reality an opaque lens. Since this discovery, many remedies have been recommended for the cure of cataract. As early as 1781 it was advocated that bleeding, cupping, scarifying, and blistering be utilized to repair lens changes. Frequently internal remedies such as aperients, emetics, and cathartics were given to aid in the healing process. Any number of extracts, concoctions, and distillates of herbs were used locally as specifics for this disorder. In 1798, James Ware[1] of London published a translation of "A treatise on the cataract" by Baron De Wenzel.

In this dissertation, the following statement occurs:

". . . there would be no end of enumerating the various remedies that have been proposed and administered under the same idea. Their number and variety are sufficient proofs of their inefficacy. It is nevertheless true that many eminent physicians, ancient and modern, have thought that incipient cataracts might be dissipated by internal remedies; and some have flattered themselves with the idea of having succeeded not only in the commencement of the disease, but when the cataract was further advanced, and even when perfectly formed. Scultetus claims that he had checked its progress by applying to the eye the gall of a pike mixed with sugar; another author boasted of having successfully used for this purpose, the oil of the eel pout (mustela fluviatilis). These assertions, however, and others of a similar nature, have been severely censored by men whose opinion is of great authority in the medical profession."

It is a matter of common knowledge that in the last century many papers have been written on medical treatment of cataracts. The following excerpt is taken from a paper written in 1930 by Doctor John E. Weeks[2]:

"In dealing with cataract it is admitted that nonoperative treatment is desirable if it can be of use to retain vision by arresting the progress of, or by retarding the development of cataract. Many trials, with many remedies, have been made with this end in view by reputable physicians as well as by quacks. In the early nineties, Doctor M., Sr., of New York, made it a practice to apply the constant galvanic current to the eyes of his private patients with incipient or immature cataract."

In this paper Weeks also points out that in the treatment of cataract local irritants have been employed for many years by reputable ophthalmologists as well as by quacks. The host of remedies employed includes heat, usually in the form of solutions of various kinds, physiologic solution of sodium chloride, boric acid, water, and hot and dry compresses. These applications were used to stimulate the ocular tissue so that nutrient fluids could reach the lenticular substance.

As a representative example of this mode of treatment, Doctor Weeks relates that

". . . in 1887 and in subsequent years, the late Doctor K. of New York asserted that he had discovered a method for the nonoperative treatment of cataract that would cause it to disappear in some cases and arrest its development in other cases. His method consisted in instilling a mixture of boric acid and glycerin into the affected eye, and then submitting the eye to a more or less gentle massage of from three to ten minutes' duration, three times a week. The treatment necessitated office visits and extended over a period of two months. Dr. K. did not confine the treatment

* From the Department of Surgery, Section of Ophthalmology, Yale University School of Medicine. Read before the New England Ophthalmological Society, Boston, Massachusetts, December 21, 1937.

to incipient cataract. He presented what appeared to be favorable results in many of his cases. In some cases maturity seemed to have been accelerated, apparently as a result of the massage. Doctor K., who was a reputable physician, lost caste with his colleagues; however, the method of treatment, which he strenuously advocated awakened much interest."

In his own behalf Doctor Weeks states:

"Early in my medical career I acquired the impression that cataract was due to a lack of a sufficient supply of proper pabulum to the crystalline lens, or that the food supply, although sufficient, contained substances detrimental to the lens metabolism. This impression was strengthened by the observation that in certain cases the development of cataract was arrested, or its advancement greatly retarded by improvement in the general health."

In the endeavor to arrest or to retard the development of senile cataract, Doctor Weeks says,

"I have determined to supplement improvement in general health by improvement in local nutrition, if possible by periodically increasing the flow of blood in the anterior tissues of the eye. A number of measures were tried; eventually a mixture of equal parts of a solution of boric acid, 3 percent of glycerin was selected. It was found that this mixture, when instilled into the eye, produced a sharp, smarting sensation, lasting about a minute, and an active hyperemia. Hyperemia always follows the instillation of this mixture; tolerance, such as follows repeated instillations of ethylmorphine hydrochloride, is not established; consequently, it can be used indefinitely with the assurance of a uniform result. Although the use of this mixture has been continued, by some patients for at least 10 years, I have never observed any untoward result."

It is apparent from analyzing the numerous papers on nonsurgical treatment of cataract that the changes in the lens are produced either by local disturbance of nutrition, or by general metabolic disorder associated with other factors whose definite rôle in the transformation of the transparent lens to an opaque status is still inexplicable. Several prominent ophthalmologists have been able to check the progress of incipient cataracts either by using local medication and irritation or by removing foci of infection and building up the body with proper food or by a combination of local and general treatment. Various attempts have been made to duplicate in animals the type of lenticular changes observed in man. Although cataracts have been produced in animals in various ways, no definite solution of the problem is at hand. It may be well to recount some of the more recent studies on the function and metabolism of the lens so as to gain a better understanding of the problem.

Metabolism of normal lens

Although many authors have written on the metabolism of the lens, the mechanism of this system is not very well understood. It is safe to state that it is an internal respiratory mechanism in which oxidation and reduction of substances take place. Alghren[3] in 1923 found that the reducing power of the lens tissue was about five times as great as that of the nerve tissue. He attributed the process of reduction to the presence of autoxidizable substances such as the SH group and especially to the presence of dehydrogenases in the lens. In 1924, Goldschmidt[4] showed that glutathione was present in the lens in a dialyzable form, and when it was removed by dialysis the power of the lens to utilize oxygen ceased; later Adams[5] showed that when a small quantity of glutathione was added to the lens the oxygen activity was restored to normal. Alghren also demonstrated that the lens cortex consumed more oxygen than the nucleus. There is evidence that the lens has many other enzymes which may participate in its intricate metabolism. Recently it has been shown that the lens also contains cevitamic acid and that 30 percent of the total reduction as determined by the iodometric method is accounted for because of its presence. Vitamin C, or cevitamic acid, is considered of fundamental importance in tissue respira-

tion, for it seems to act as a "hydrogen transport agent between organic metabolites and indirectly molecular oxygen" (Sherman[6]). It was discovered that the lens and the aqueous humor have a very high reducing value toward the dye 2-6 dichlorophenolindo-phenol. The investigators concluded that the reducing substance in all probability was cevitamic acid. This finding has not been satisfactorily demonstrated biologically. Its presence in the lens tissue is therefore speculative and it is questionable whether it is formed in the lens or that the reversibly oxidized form of cevitamic acid, which is present in the blood, perfuses into the aqueous humor and is reduced to vitamin C in the presence of the lens.

Although considerable work has been done on the metabolism of the lens it is still a moot question whether glutathione and the sulphhydryl groups are solely responsible for the metabolism or whether cevitamic acid also plays an important part in the internal respiration of the lens.

The physical and metabolic integrity of the lens is, to some extent, dependent upon the maintenance of a normal metabolism of the eye. It is possible, on the other hand, that general metabolic disturbance may affect the lens by creating a deficiency of some substance essential to lens metabolism or by producing toxic substances, or by changes in the blood stream which in turn alter the composition of the aqueous humor. Thus the content of inorganic substances may be changed or hydrogen-ion concentration altered so that the normal metabolism of the lens is interfered with. It should not be inferred that every disease or metabolic disorder leads to cataract formation. Cataract is associated with only a limited number of pathological conditions; and in these the factors which act upon the lens and initiate the degenerative changes have not yet been identified. The relation of certain particular factors to cataract formation will not be discussed.

Theories advanced for cataract formation

The mystery of cataract formation has not as yet been solved. Many theories have been advanced to establish the underlying cause of this condition. It is difficult to separate these many concepts into a few principal groups. The classification which appeals to me is that in which the changes in the lens are attributed to: (1) heredity and senility; (2) local changes in the ocular tissue; and (3) general metabolic disturbances.

The frequency of senile cataracts varies in the different countries. It is a well-known fact that lenticular opacities are much more frequent where the nutrition of the people is much below normal and where excessive glare is constantly present.

It is true that some outstanding ophthalmologists believe that heredity plays an important rôle in cataract formation, whereas most ophthalmologists consider physiological changes of senility as a reasonable cause for the greatest number of cataracts. Although lenticular changes may be prevalent in people over 60 years of age, not all aged individuals have cataracts. It is conceivable that if the span of life continues to increase, cataracts may be definitely proved as due to senile changes. I am not willing as yet to accept the theory that these cataracts are merely changes associated with advancing age. I believe this type of cataract is produced by improper metabolism of the lens, probably due to a general disturbance.

The theory that cataracts are caused by local ocular conditions has many advocates. Several authorities, however, ask what is the cause of this local condition? If the changes are entirely local why is

cataract so often bilateral? O'Brien[7] like many other ophthalmologists believes that there is probably some general disturbance of the metabolism and that these metabolic disturbances are probably mild and act over a long period of time; for the average cataract progresses rather slowly and it frequently takes a long time before the entire cortex becomes opaque.

It is not unusual to find lenticular disturbances at all periods of life due to some dysfunction of general metabolism. Cataracts are associated with disturbances of the ductless glands. Outstanding in this group are the lenticular changes observed in Mongolian idiocy, cretinism, myotonia atrophica, aparathyroidism, and tetany. Every ophthalmologist is acquainted with cataracts associated with diabetes mellitus, and also with cataracta complicata in which the posterior capsule is involved. Several observers have written of their experiences with dinitrophenol cataracts.

The formation of a cataract is in reality a denaturation of the protein of the lens fibers. Changes in the concentration of salts and in the hydrogen-ion concentration of the lens may be factors responsible for coagulating the proteins; the variable existence of the aforementioned factors is most likely due to changes in the permeability of the lens capsule rather than to any change in the chemical composition of the aqueous. The hydrogen-ion concentration of the aqueous humor remains very constant, like that of the blood, and it is doubtful if the variations which have often been found in the disease could account for the coagulation of the lens protein directly. Changes in the permeability of the lens capsule are known to occur in cataract.

Experimental investigation

For one who has been privileged to engage in experimental investigations on animals, it is obvious that it is within the realm of possibility that some method may be established for duplicating in animals changes observed in the human. It is the experience of investigators that the experimental condition frequently falls short of the exact duplication of the disturbance in man. Only by careful comparison with the true clinical picture can the limitation of the experimental condition be appreciated. It is thus of the utmost importance that clinical observations be skillfully interpreted.

When Day, Langston, and O'Brien[8] reported the formation of cataracts in young albino rats on a diet deficient in vitamin G they opened up a new era of investigation. This, however, was not the first instance in which cataracts were induced by the lack of a well-balanced diet, for Curtiss, Hauge, and Kraybill[9] reported similar disturbances in young animals on a diet low in the amino-acid, tryptophane. I repeated the experiment but was unable to obtain cataracts. It is possible that the diet which I used was not the same as that of the previous investigators, but it was deficient in tryptophane. Prompted by the observations of Day, Langston, and O'Brien, Guida and I[10] repeated the work; when the instructions of preparing the food and feeding it to the animals were observed, we likewise obtained cataracts in our animals, but when we used a different source for vitamin B_1 the lenses were not affected. Recently Day[11] and his collaborators identified the vitamin which acts as a cataract-preventive factor in their experiment. This vitamin may now be obtained in pure form and the substance is known as lacto-flavin (or ribo-flavin). They demonstrated that 30 to 90 micrograms of lacto-flavin added to the deficient diet prevented cataract formation. I believe that this observation will prove invaluable to cataract investigation of the future.

At the request of Helen Mitchell[12] I

repeated her work with lactose in the albino rat. It was apparent that the lens changes that she observed could be repeated in the animals of the Connecticut Agricultural Station when they were fed the same amount of lactose. With this observation in mind, it occurred to me that the components of lactose should be investigated in order to determine whether the galactose factor had any part in the formation of lenticular changes. It was noted that when 25 percent or more of galactose was fed to the albino rat cataracts developed. When the animals were started at weaning on a diet having 35 percent or more of galactose, the lens changes appeared in the nucleus of the lens within 14 to 20 days. In the older animals the changes appeared in the cortex, but it took a much longer time to develop. Whatever factors were responsible for the formation of the cataracts it seemed that the active functioning cells were the first involved. In the young animals it affected the nucleus and in the older ones the cortex.

With the experience of producing cataracts in albino rats fed on a diet of 35-percent galactose, it seemed expedient to establish a method for delaying lens changes. In view of Adams's work with naphthalene cataracts it seemed worth while to reinvestigate the subject by feeding the albino rats either cabbage or cystine or calcium carbonate as a supplement to the cataract-forming diet. It was thought that these materials might check the progress of the lens changes. Several groups of albino rats were placed on the 35-percent galactose diet, supplemented with either 2-percent or 4-percent cystine, or cabbage ad libitum or calcium carbonate 125 mg. and 250 mg. per 10 gm. of food. These supplementary ingredients had no effect on the progress of the lens changes. Further experimental investigation was made on several groups of albino rats on a 15- and 25-percent galactose diet plus the aforementioned supplement. The animals, on 15-percent galactose, rarely showed any lens disturbance, but when given 25 percent, definite opacities were found in the cortex of the lens.

It was concluded from this investigation that cabbage, cystine, and calcium carbonate had no influence on lens changes. The question then arose whether cataracts could be induced when galactose was injected parenterally. Six groups of albino rats were used in this experiment.

The first three groups of animals were injected every other day with 2 to 3 c.c. of a 20-percent galactose solution, which was gradually increased to a heavy viscid solution of 80 percent. The experiment lasted over two months, but no cataracts were induced. Three more series of albino animals were injected with 60-80 percent galactose over a period of two months, but lens changes were not observed. The fatalities in the three latter groups were much greater than those of the first. In this experiment an attempt was made to introduce as much galactose in the peritoneal cavity as was possible, but at no time did the average injection reach beyond an equivalent of a 15-percent daily ingested ration of galactose. It is possible that if an equivalent of over 25-percent galactose could have been injected with safety, cataract might have developed, but as the experiment now remains there is no solution to the problem. The bacterial flora of the intestinal tract of all these animals was studied. To an inexperienced observer it seemed that at last the solution to the problem was at hand, but Doctor Valley, our bacteriologist, reviewed the work and commented that the analysis of the bacterial flora of the feces was within normal range for the albino rat. The question still remains "How does galactose act in the body so as to produce lens changes?" It might be well to alter the diet so that the animal will receive a high or low fat or protein content;[13] perhaps

this change may delay or hasten the lenticular disturbances. This investigation might be extended so as to include glutathione, lacto-flavin, and cevitamic acid as a supplement to the 35-percent galactose.

Although no definite solution was obtained from our experimental investigation and from a review of the current literature, it seemed worth while keeping an open mind about the subject of cataract formation and to treat all ocular conditions in which no definite causative agents were found as due to a lowered resistance of the body either because of improper food or poor hygienic habits and emotional stress or to a combination of these disturbances. It is with this assumption in mind that I would like to discuss the possibility of lenticular changes being produced in the eye.

Clinical findings

During the last five years I have made an effort to transpose laboratory findings to the private and clinical practice of ophthalmology. It has been a fascinating endeavor, full of speculative interpretation and intriguing results. I am fully aware of the failure of many ophthalmologists before me to cure cataracts and also the embarrassment they suffered at the hands of their colleagues for presenting incomplete stories on this subject. Nevertheless, it seems to me worth while to relate my experience with the nonsurgical treatment of cataract. The question frequently arises as to what constitutes a cataract, since opacities can usually be detected by the use of the slitlamp in all elderly people. I believe that for the present the ophthalmoscopic examination should be the prevailing criterion for determining the status of lenticular changes.

The slitlamp should play an important rôle as an aid in determining the progress or arrest of cataract. Progress of lens opacities is slow, so that it takes a long time to gather adequate data on which to base a prognosis in a given case. It would be instructive, however, to include a slitlamp study of the lens and place it alongside of the ophthalmoscopic finding. Norms must be established before a real scientific investigation can be valuable, for faint subcapsular iridescence and minute punctate and linear markings are frequently found in nonpathologic conditions of the lens. As the normal lens grows older there appears often a series of changes which may be considered physiological processes and not cataractous; the shagreen of the lens capsules becomes accentuated.

The so-called senile cataract may be divided into groups according to the location and mode of change. The nuclear cataract has its origin in a process of pathologic sclerosis of the central lens fibers. Persons with such a condition have often remarked on their so-called second sight. The lenses early exhibit no definite opacities but merely a haze, followed by a diffuse clouding of the central area of the lens. This interferes considerably with vision, for it is directly in the visual axis. Frequently the lens change may begin as nuclear opacities and progress to maturity only through the subsequent process of subcapsular or cortical involvement. The interior of the lens, particularly the adult nucleus, shows irregularity of its smooth (juvenile) contour, the sutures become more prominent, and frequently temporary fluid vacuoles appear underneath the lens capsule. In the subcapsular cataract there frequently appear in the youngest layers of the lens, just beneath the anterior and posterior capsules, vacuoles or globules of various forms. They increase in number and usually follow the deep surface of the capsule. The process may progress fairly rapidly and involve the cortical and nuclear layers, thus developing a progres-

sive haze that leads to complete clouding and finally disintegration of the lens protein.

Let me describe some of the lens changes as seen through the ophthalmoscope in which diet and the vitamins seem to play an important rôle. Not all of the changes are necessarily found in every lens. The lens changes that seem to predominate are minute globules or vacuoles just beneath the capsule; suture lines that have been split by clear fluid, producing an appearance of irregular refraction lines; minute opacities associated with isolated vacuoles or globules in the suture lines; peripheral wedge-shaped opacities that seem to follow lamellar separation and frequently form spokes or sector opacities; the lens-suture system may be split from the center outward and a haze may be found in the peripheral portions of the lens particularly in the inferior nasal quadrant. The altered lens substance may appear as a flocculent suspension or be deposited along the walls of the split suture.

I should like to cite a hypothetical case of lenticular disturbance which I believe should receive a well-regulated diet plus the vitamins. Mrs. A., the wife of a farmer, is 64 years old, a white, heavy-set individual, whose general appearance would classify her as a healthy person. She finds that she is unable to see through her new glasses which were given her four months ago by an oculist. From the patient's history, I learned that her previous glasses were stronger and the eye doctor made them weaker so that she could see the minister. Nothing was said to her about her ocular condition nor did she receive any advice about her health. She is now wearing a + 3.00 D. sph. ⊂ + 0.75 D. cyl. ax. 90° for both eyes, with an addition of + 2.50 D. sphere for near vision. With this correction she sees 20/50 in the right eye and 20/40 in the left eye; without her glasses, she sees with the right eye 20/300 blurred and with the left eye 20/300. The pupils react directly and consensually to light and accommodation for the near point. No muscle imbalance is found. The intraocular tension is normal, the cornea is clear. With the retinoscope the retinal reflection shows a slight irregularity in the center of the pupil.

On examination with the ophthalmoscope, it is noted that a few globular refracting areas are present in the lens. They are distributed so that the upper and lower half of the superficial layers of the lens contain an equal number. Nothing unusual is detected about the rest of the lens except at the equator, where a few striae are seen below on the nasal side. Examined with the slitlamp it is noted that the globular areas are located in the subcapsular area and some of them invade the superficial part of the cortical tissue. The shagreen of the anterior and posterior capsules is slightly more refractive. The fundi are negative except for a slight arteriosclerosis. Following, a retinoscopic examination the patient accepts a weaker correction, so that with a + 2.00 D. sph. ⊂ + 0.50 D. cyl. ax. 90°, the vision is improved to 20/20 blurred in the right and clear in the left.

Under a mydriatic no further change is observed except that at the equator of the lens a few more radial striations with the base at the periphery and apex toward the center of the lens are seen.

Mrs. A. was not given a pair of new glasses on her third visit, for I found the original lens improved her vision to 20/20. It is apparent, therefore, that the temporary tumescence disappeared. She has been seen at intervals of three months over a period of five years. There is no increase in her lenticualr changes and Mrs. A. has gained 10 pounds and is feeling fine. Before leaving Mrs. A. I want to state that two years ago her husband died and immediately following this unfortunate incident, her vision again became blurred. When she regained her composure and the emotional state improved, the vision returned to normal.

It is my policy, when this type of case appears for treatment or advice, to request a general physical examination. I usually inform the patient that certain changes have taken place in the eye because of some irregularity in the diet and possibly general health. With the aid of the family physician, a sensible diet is prescribed depending on the likes and dislikes and habits of the individual. The patient is also instructed by the physician concerning general habits. In addition, a teaspoonful of potent brewer's yeast powder three times daily is prescribed, and at the end of one week's time the patient is told to take the juice of at least two lemons in the form of a lemonade, daily, before

lunch and dinner. If the yeast or lemon juice upsets the patient, it is temporarily discontinued. The patient is also told that a weaker pair of glasses will increase the vision, but in view of the little disturbance present in the eye, it is better to treat the condition for two months before the lenses are changed. At the end of the trial period, it may be found that the subcapsular globules have disappeared but that the striae at the equator of the lens are still present; the vision may be the same or less with or without glasses. If the visual acuity is better with the old glasses it is apparent that the therapy has done some good and is continued without a change of glasses. If, however, there is no improvement, the patient is given a new correction to improve the vision to 20/20 and is also instructed to continue with the medication and return in three months.

Records of the lenticular changes, ophthalmoscopic and slitlamp, should be recorded in a simple manner. May I suggest that a circle divided into quadrants will suffice for this purpose. Visual acuity, with and without correction, intraocular tension, fields of vision, and fundus observations should also be recorded.

During this hit-and-miss period of observation, I gathered considerable information which I believe will be valuable in formulating a plan of attack. It is important to record the type of diet prescribed, for a standard diet cannot be used for each patient. Observe whether the patient is gaining or losing weight and what personal attitude is taken toward this régime. Try to allay any emotional stress, for this state of affairs may ruin the previous improvement in a very short time.

Diabetes must be ruled out, since it may produce diminution in hyperopia or increase myopia without showing any definite lens changes. In cases of diabetic cataract, instances of clearing of opacities have been reported following the decrease of the blood sugar and correction of other factors associated with diabetes. Patients with hypoparathyroid tetany may require calcium with vitamin D and parathyroid hormone parenterally. If there is any history of photophobia, hemeralopia, or "glare blindness," prescribe a tablespoonful of potent cod-liver oil daily before dinner.

One must not lose track of the fact that many patients are seen with lens changes of the type already described who show no progress over a long period of time. Some of the older ophthalmologists have observed this type of cataract continue for many years without any apparent change. I have also seen some people who have informed me that 20 years ago or even more their oculist told them that they had a cataract; from the history and an examination of the eye, it was apparent that no change had taken place during this period.

This is a difficult subject to handle and it gives rise to many misgivings, for early incipient lens changes may possibly clear up without any treatment, and in some instances local medication has accomplished the same thing. I have been impressed with one truism, and that is, once lens changes in the form of opacities are formed, they do not disappear after local medication or general treatment. On the other hand, if the lesion is due to an invasion of the tissue by fluid, the lens will return to its normal state if the therapy is effective. There is no excuse for charlatanism in the handling of patients with cataract. But there is a real necessity for assuring the patient while the general physical conditions are being investigated and any abnormalities are being corrected that there is some hope of improvement. When attempts to improve the vision have failed it is well to tell the patient that you have done all that is possible at

the present time to check the condition, but that it is important that he continue the treatment and if the vision becomes worse, he can always be operated on and have vision restored. Patients with increasing lenticular changes should be examined at frequent intervals to note the change in refraction. Unfortunately one cannot estimate accurately the future rate of progress, as so many individual factors are concerned therein. A change in glasses is reassuring to the patient if it corrects the lenticular myopia and astigmatism which may develop.

In discussing the prevention of cataracts in man the thoughts of the ophthalmologist naturally are directed to the middle-aged and senile persons. It has been observed that a gradual change in dietary health is frequently associated with advancing age. This process is attributed to lessened activity, decreased appetite, and loss of teeth. There is some evidence to support the hypothesis that a vitamin deficiency may, in many cases, contribute to the onset of certain degenerative processes and manifestations of senility. It therefore is important to know what part the vitamins play in the maintenance of normal nutrition and health in this age group.

Vitamin A

According to Sherman[6] vitamin A serves both as a tissue-building and as a regulatory substance. It is essential both to the growth and development of the body, and to the orderliness and efficiency of the nutritional processes that go on at all ages. The body stores a considerable part of the surplus; and if the intake is sufficiently liberal, the body may store enough to last for a relatively long time, so that a subsequent temporary deficiency of intake may show no effect. Sooner or later, however, a lack of adequate vitamin-A value in the food results in a condition of vitamin-A deficiency in the body (sometimes called an A-avitaminosis).

The specific effect of the absence of vitamin A in albino rats, guinea pigs, and humans is found in epithelial tissues. It was my impression when engaged in this investigation 15 years ago[14] that the lack of vitamin A in the experimental animal lowered its resistance so that the tissue was susceptible to invading organisms; but Wolbach showed that the lesion was really a substitution of stratified keratinizing epithelium for the normal epithelium in various parts of the respiratory tract, alimentary tract, eyes, and paraocular glands, and in the genito-urinary tract.

It is now well established that vitamin A plays an extremely important part in adult nutrition. It should be supplied in liberal proportion not only to youth during growth, but in the food of the adult as well, if a good condition of nutrition and a high degree of health and vigor are to be maintained.

Vitamin B

Laboratory investigators have shown that if an animal is fed a diet good in other respects but devoid of vitamin B it will sooner or later cease to eat; then if fed vitamin B, even separately, appetite returns and the animal resumes eating the food which it had refused. According to Sherman,[6] vitamin B seems to be concerned in the maintenance of normal motility of the digestive tract. The loss of normal motility may also extend to the intestines. Thus the frequently reported constipating effect of highly refined dietaries may be due in part to paucity of vitamin B. It is responsible in part for the stimulation of appetite and "toning up" of the digestive mechanism. Recently it was suggested that vitamin B is in some way concerned in the metabolism of carbohydrate in the body.

Vitamin G

In speaking of vitamin G, I must also enlist the opinion of the laboratory investigator. From his experience with animals he concludes that vitamin G is essential to growth and to normal nutrition at all ages. When the food is poor in vitamin G for any considerable length of time, digestive disturbances, nervous depression, general weakness and deterioration of tone, and an unhealthy (or "unthrifty") condition of the skin are apt to develop; the incidence of infectious disease seems likely to be increased, vitality diminished, life shortened, and the prime of life curtailed by the early onset of senility.

Vitamin C

There are now a number of observations on record which indicate that a liberal intake of vitamin C protects against capillary fragility and helps to protect the body from such changes as are characteristic of the aging process. The thought is even entertained that the body may or may not develop arteriosclerosis according to the liberality with which vitamin C is supplied. In view of such findings and those which indicate that so called "healthy people" may have very different concentrations of vitamin C in their tissues, it would seem to be well for us to keep ourselves well "saturated" with vitamin C by taking a liberal proportion of our needed food calories in the form of fruits and vegetables.

What are the essentials of a well-balanced diet? According to nutritionists, a dietary made up of such natural foods as whole seeds, fruits, leaves, milk, and eggs in scientifically prescribed proportions and eaten in sufficient amount to meet all the nutritional needs is well balanced.

Vegetables and fruit taken as a group may be ranked next after grain products and milk in importance as constituents of any economical well-balanced diet. They tend to correct both the mineral and the vitamin deficiencies of grain products and supplement the milk. Many of the vegetables and fruits are rich in iron or vitamin C or both.

We have come to realize that enrichment of the dietary in vitamins C and G, as well as in vitamin A and calcium, is usually beneficial; and this not merely for protection against actual deficiency, but also for the promotion or enhancement of vitality. It is important, therefore, that the ophthalmologist become acquainted with the newer principles of nutrition, for we are now in the midst of a new interpretation of an old therapeutic story.

Conclusion

As a result of the knowledge that a cataract was an opaque condition of the lens, many attempts were made to reverse the processes by treating the eye locally and systemically. Because of the poor results following the surgical treatment, many of the earlier ophthalmologists were more prone to treat the condition with nonsurgical methods. With the advent of better surgical technique and local anesthesia, the ophthalmologist looked forward to removing the opaque lens by surgical means. It is probable that every practicing ophthalmologist is satisfied that cataract formation is not due to a single factor but is produced by many conditions. Outstanding among these causes may be considered a disturbance of the general metabolism of the individual with a subsequent local change in the eye. Although arteriosclerosis has never been definitely considered as a cause for cataract, it is my belief that it must play a significant role in this respect. In view of our present knowledge of human nu-

trition it is advisable that all elderly patients having any signs of early changes in the lens be instructed how to live properly.

I believe that we have a right to treat our patients with a well-balanced diet supplemented by the vitamins in order to check and prevent this condition. It was possible for the ophthalmologist to eradicate trachoma in many large cities and phlyctenular keratoconjunctivitis in many communities. I see no reason why we cannot raise men and women in the future without cataracts.

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A GLARELESS BED READING AND EXAMINING LAMP WITH VARIABLE INTENSITY AND PLACEMENT OF LIGHT*

C. E. FERREE, PH.D. AND G. RAND, PH.D.
Baltimore

In planning the units to be described in this paper we have recognized three types of use for a bed lamp: (1) as a reading lamp in homes, hotels, and elsewhere, and in private rooms in hospitals; (2) as a reading lamp in hospital wards where the eyes of patients on the opposite side of the ward must be carefully protected from glare; and (3) as a lamp for making various types of examination of a patient who is lying in bed. Models will be described designed to give glareless illumination in all these situations and the best distribution of light and brightness that it is possible and feasible to attain, we believe, in a bed lamp. Also, provisions are made for the correction of the light to daylight color when desired. In the examining lamps, moreover, the intensity of light may be varied from zero to full without change in the color or composition of the light; in the size, shape, and position of the illuminated area; or in the evenness of distribution of light within this area.

In the designing of bed lamps for reading, little attention thus far has been given to the requirements of a good reading light. As pertaining to ordinary use, the principal features seem to have been that it can be clamped on the head of the bed or otherwise supported in approximately that relation to the reader's head and face, that it shall be inexpensive, and that it shall throw light on the reading page. The opening of the unit is usually above or nearly above the reader's face and little or no provision is made to shield his eyes from the high brightness and glare of the opening and to prevent reflection into the eyes from the glass and frames when eye glasses are worn. There is usually very annoying glare from the page itself due to poor diffusion of the light, to the position of the light in relation to the page and its nearness to the page; and the distribution of light and brightness in the field of view is very bad, the area illuminated being small and of high brightness as contrasted with its surroundings. The contrast induced by this "spotlight" effect further accentuates the unfavorable brightness and glare on the reading page and in the illuminated area in general. If there is no other illumination in the room to reduce the brightness difference between the area illuminated by the bed lamp and its surroundings, the effect is almost intolerable. Further, usually no provisions are made for the protection of the eyes of others in the room from the glare of the opening of the unit. In many situations this protection is highly desirable, particularly in the use of the unit in hospitals.

The following are some of the requirements of good lighting by means of a bed lamp: (1) the unit should be at a favorable distance from the face, the reading page, and the surface of the bed. This provides for a wide spread of illumination and eliminates the "spotlight" effect. (2) The light should be well diffused. This very greatly increases the spread of the illumination and reduces the glare on the reading page and other surfaces to a minimum. (3) The eyes of the reader and of all persons in the room should be protected from the glare of the opening of the unit. (4) The unit

* From the Research Laboratory of Physiological Optics, Baltimore, Maryland.

should give a fair amount of general illumination to the room. This carries still further the beneficial effects of spread of illumination and is particularly needed when no other means of illuminating the room is employed, as is often desirable in the use of a bed lamp. In producing the wider spread of light, the optimum effects are obtained, so far as the general illumination of the room and the surrounding field is concerned, when the walls about midway between floor and ceiling receive the greatest amount of light and the brightness shades off gradually upwards and downwards.

The general question of the optimum distribution of brightness in the field of view should, perhaps, receive brief consideration at this point, inasmuch as it sustains an important relation to the illuminating effects obtained by the type of bed lamp under consideration. It might seem natural to assume that the brightness of the field of view as background should be uniform. Until recently, overlooking the significance of results we obtained as early as in 1913,[1] we were inclined to make this assumption. These results indicated that the eye's tolerance of brightness is by no means the same for all parts of the field of view. Considered broadly, its lowest tolerance is in the lower half of the field, the next lowest in the upper, and the highest in the region of the bounding plane between the two halves of the field. Translated into terms of enclosing surfaces of a room of ordinary height, this would mean that the brightness should be highest on the walls near the mid-level of the room and shade off gradually towards floor and ceiling. So located, the level of maximum brightness would be near that of the eye and not far removed from the plane of work. We were brought to a realization of the advantage to be obtained by this type of distribution of brightness in experimenting with the bed lamp under consideration during the period of its development and construction. By means of this lamp, particularly with one of the earlier models, the highest brightness could be given at will to the ceiling or walls at any level of height from floor to ceiling. The superior

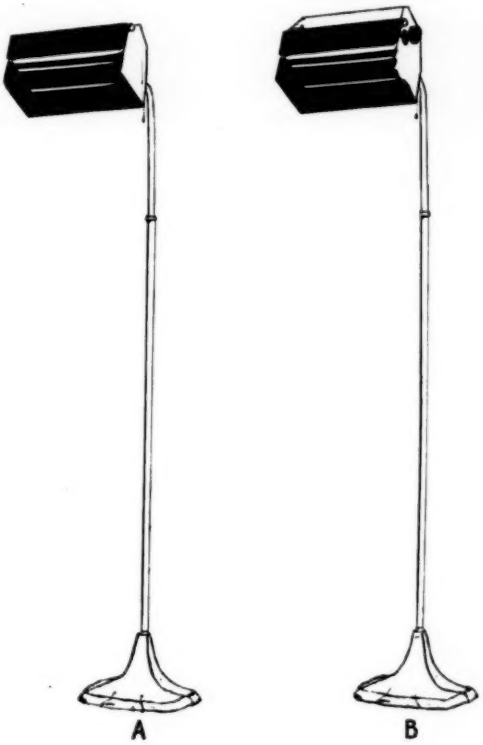

Fig. 1 (Ferree and Rand). Glareless bed lamp. A, reading lamp for hospital wards. B, combined reading and examining lamp.

comfort, restfulness, and entire naturalness of the effect produced when the highest brightness was given to the walls midway between floor and ceiling was pronounced and most convincing. This was equally true when the effect was obtained from the position of the reader in bed, or when it was judged by one standing or sitting in the room or viewing it from the outside. When the shift of maximum brightness was made to the ceiling or the lower part of the room, the effect

produced by the change was uncomfortable, annoying, and decidedly unnatural. Only when experienced in sequence could this difference be appreciated to the full. Ordinarily, there is very little opportunity to make a direct comparison of lighting effects. Because of this, many differences in effect so great as not to need the aid of tests for their detection are completely overlooked.

It will be noted in rooms lighted by daylight from windows that, including both windows and illuminated surfaces, the maximum brightness is broadly distributed over the mid-level of the field of view. Because of the smaller amount of light reflected by the floor and objects in the lower part of the room, the lower part of the field in rooms lighted by windows usually has a low brightness. The lighting of rooms by windows is a type of lighting to which the eye has become accustomed through long usage and is a very comfortable and restful type of illumination when precautions are taken for protection against glare from the windows themselves.

The bed reading lamp

The first model to be described was designed as a reading lamp for use in homes, hotels, and elsewhere, and for private rooms in hospitals. It may be constructed as a floor-stand unit, it may be clamped to the head of the bed, or it may be mounted on an extensible wall-bracket which can be folded back against the wall when the lamp is not in use. It will be described here as a floor-stand unit.

In general the unit consists of a supporting stand and provisions for its adjustment, a housing with glare baffles, a diffusing plate, and a screen or filter for giving daylight color when desired. The stand has a heavy metal pedestal or base, semicircular in shape so that it may fit closely against the wall. Centrally positioned near the back of this pedestal is a vertical tubular support provided at its upper end with a split ring and set-screw. Telescoping into this upright is a second tube which is bent into a right-angled position at a suitable distance from its lower end. This right-angled member is also provided at its farther end with a split ring and set-screw. Into this tubing is telescoped a third tube at the end of which on a swivel-joint is the lamp and housing. The first combination of split ring and set-screw provides an adjustment for height and allows the right-angled member to be rotated back against the wall when not in use; the second permits the housing to be set at different distances from the head of the bed. An adjustment of this type is particularly needed in a hospital when the spring and mattress are raised to an inclined position to give the patient greater comfort in reading. The swivel-joint at the end of the right-angled member permits the housing to be rotated back against this member when it is turned back against the wall. With these adjustments it is easily possible to place the lamp in suitable relation to the face and the reading page when the reader is in a recumbent position and when a section of the spring and mattress is raised to an inclined position, and to fold the lamp neatly back against the wall when not in use. They add greatly to the convenience and versatility of use of the lamp.

The housing, made of light brass, is oblong in shape with a suitably rounded top or roof. Its dimensions are 10½ × 6 × 5 inches. The lamp which may be of any wattage desired within the size limits of the housing is mounted in a horizontal position near the top of the housing. Across the opening at the bottom and part way up the front of the housing are the glare baffles and just below them

the diffusing plate. The glare baffles consist of four thin vanes of hard sheet aluminum (No. 23 B & S guage) 10½ inches long and 1½ to 2¾ inches wide. The vanes at the bottom lie in parallel planes in the long dimension of the opening and in the front wall of the housing and are spread 1½ inches apart. The slant of these vanes is made adjustable to give the proper protection for both the recumbent and the sitting or inclined position of the reader and for the examination of the face, when desired, with the patient in the recumbent position. The eggcrate or cellular construction used in our ceiling units[2] and in our desk[3] lamp was found not to be needed in a bed lamp. Full protection to the eyes of the reader and sufficient protection to the eyes of others in the room can be given without the extra set of vanes at right angles. The preferred adjustment of the housing for a reader in a recumbent position is slightly in front of the eyes and approximately 10 inches above them. In the use of the unit the intention is to have the opening at the bottom of the housing roughly parallel to the reading plane. This is accomplished by the slant of the housing, which is 25 degrees with the vertical. For reading in an approximately recumbent position, the vanes across the opening are inclined 48 degrees with the vertical or 23 degrees with the mid-section of the housing. For reading in a sitting or inclined position, they may be adjusted to suit the individual case. There are three vanes at the bottom. The one farthest forward is at the front edge of the housing and serves as both a bottom and a front vane, the vanes forming a continuous series across the bottom and for 2 inches upwards on the front surface of the housing. In effect, therefore, there are three vanes and three interspaces in the bottom and two vanes and two interspaces in the front surface of the housing. As already indicated, the bottom and front vanes lie in parallel planes, all subtending the same angle with the perpendicular and the mid-section of the housing. This angle is such that not only are the eyes of the reader protected from all glare from the opening but there is a wide spread of light over the entire bed and its surroundings and over the walls of the room at or near the level of the eyes when the reading position is recumbent. From this region of maximum illumination, the light shades off gradually towards ceiling and floor. In all, because of the wide spread of direct light and that reflected from the bed clothing and the enclosing surfaces of the room, a fairly good general illumination is given, sufficient when a 75- or 100-watt lamp is used to permit of reading in the greater part of a room of the size ordinarily found in bedrooms. In order further to protect the eyes of the reader and others in the room from all glare and high brightness, both surfaces of each vane are painted a flat black. If these vanes were surfaced so as to reflect any considerable amount of light, they would of course themselves give the effect of glare.

Between the vanes, bottom and front, and the lamp is the diffusing plate. For this purpose Belgian flashed opal glass was selected because of its high coefficient of both diffusion and transmission. By inserting this plate so that it extends from a position just above the bottom vanes at the back surface of the housing to a position just above the vanes in the front surface, one plate is made to diffuse the light passing between both sets of vanes. The effect of this plate is to eliminate all shadows from the vanes and to give a well-diffused, evenly distributed spread of light over a wide area.

Despite the fact that reading in a recumbent position is in itself conducive to eyestrain, it is surprising to find how much of the discomfort usually experi-

enced is due to bad lighting. For those who wish to read in bed or who must read in bed or not at all, this unit will be found to be almost unbelievably helpful.

A BED READING LAMP FOR HOSPITAL WARDS

The second model of the unit was designed to be used as a reading lamp in hospital wards. It is provided with a thin metal flap which can be turned down over the front vanes or turned up as the occasion may demand. The purpose of this provision is to guard those who may be in a recumbent position on the opposite side of the room from any possible trace of glare from the front louvers. The flap is supported by a swivel hinge at the top and both ends, and is provided with a small knob for convenience of adjustment. When turned back against the slanting front surface of the housing, it remains in position without any special provision for its retention in that position. The inner surface of the flap is painted flat black. When the flap is turned down, the protection of the eyes of those lying in bed on the opposite side of the room is absolute; and while the lighting effects are not so good for reading as when the flap is turned up, they are incomparably better than those obtained from any other bed lamp that has as yet come within our experience. A photograph of this model with the flap turned up is shown at A of figure 1.

A BED READING AND EXAMINING LAMP

Various medical men in hospital service have called our attention to the need for a bed lamp which can be used for the examination of the face without disturbing the patient. In some cases the patient may be asleep and in others in a comatose or semicomatose condition. The requirement here is obviously a unit the light from which can be increased in gradual and continuous change from zero intensity to the amount required for the examination or inspection of the face. It is essential, also, that this change should be made without change in the color and composition of the light, and it is further desirable that the light be corrected for color in order to give as natural as possible an appearance to the face. We have been able very easily and inexpensively to add these two features to the bed lamp described above. The correction for color may be obtained by substituting for the Belgian flashed opal glass an etched plate of glass having the approved special transmission.

For color correction one would ordinarily select the Macbeth daylight glass. In connection with our present problem, however, we encounter an eye phenomenon which should be noted here. The eye does not balance the wave lengths of light to white in the same proportion at different levels of intensity. Light which appears white at medium and high intensities, is without any change in composition seen as bluish at low or twilight intensities. Since the inspection is to be made at some one of the lower intensities, such light is unsuitable for our purpose because of the tendency to make the face appear unduly livid. We have found it better to use, instead, another product supplied by the Macbeth Daylighting Company called Whiterlite glass. This glass is matched to a lower color temperature and does not so completely correct Mazda light for the excess of the long wave lengths. Under the light from it, the face has a more natural appearance at the low intensities needed for this examination than is given by the fully correcting daylight glass. Further, the total transmission of light obtained with the Whiterlite glass is considerably greater than with the daylight product. This is a

great advantage, of course, in all cases where the more rigorous correction is not wanted or needed.

As a means of varying intensity of light a rheostat is utterly unfit. One reason for this is the radical change produced in the color of the light. At the low intensities needed for the examination, the light would be of a reddish-orange hue and further, since this hue would change continuously with change of intensity of light, color correction is entirely impossible. Another reason is that by means of rheostats, as ordinarily constructed, the decrease of intensity can not be carried in continuous series to zero. Obviously a mechanical means of control is needed. We have devised such means which can be used in connection with all local lighting units at little cost and trouble of manufacture.[4] It provides for a decrease of intensity of illumination in continuous series from the full output of the lamp to zero, without change in the color or composition of the light; in the size, shape, and position of the illuminated area; or in the evenness of distribution of light in that area. In the case of the present unit it consists of four vanes which extend across the housing in a plane just above the diffusion plate in such relation to each other that when their flat surfaces are parallel to the beam of light, the maximum amount of light passes through the diffusion plate; and when they are rotated into a position at right angles to the beam, the light changes in continuous series from full intensity to zero. These vanes are made of thin sheet aluminum and are painted flat black on both surfaces. At the central portion of each end of the vane is attached a pin or shank, at the other end of which is a cogwheel or gear with a diameter of 1¼ inches. The four cogwheels are meshed so that when one of them is turned through 90 degrees, the vanes pass from the position giving full light to that of complete extinction. For convenience in turning, a small knob is attached to one of the cogwheels. We have devised two means of eliminating the slack or backlash in a cogwheel system.[5] Such means should be employed where a calibrated photometric scale is used or where for some other reason a high precision of setting is required. They are not needed in the present case and will not, therefore, be described. As noted above, the diffusion glass of Belgian flashed opal glass or etched Whiterlite glass, as the case may be, is directly beneath the vanes and between them and the surface to be illuminated. This provision insures that no shadows shall be cast by the vanes in any position into which they may be turned and secures, in addition, an exceptionally good diffusion of light. The contiguous vanes, it will be noted, from the way they are driven, turn in opposite directions. This insures that there will be no shift in the position of the illuminated area and no change in its size or shape. When the vanes all move in the same direction—for example, as is the case in Venetian blinds—changes in all these respects take place. The use of such vanes as we have employed in combination with a diffusion plate provides a very simple mechanical means of varying the intensity over any range of illumination that may be desired and one that can be used with a 1000- as well as a 25-watt lamp.

A model of bed lamp provided with this means of varying intensity is shown at B of figure 1 and in the drawings in figure 2. This type of unit is to be used both as a reading and examining lamp. It consists of the second model described, to which is added the means for varying intensity. This combination model may thus be made to serve all the purposes outlined at the beginning of the paper.

That is, with the flap over the front louvers turned up and the intensity control open, the unit gives the best lighting effects for reading and is the type best suited for homes, private rooms in hospitals, and elsewhere; with the flap turned down and the intensity control open, it serves an excellent purpose as a ward light; and with the flap turned down and the bottom vanes turned into the vertical position, it may be used as an examining lamp—in which case the light control is used to vary the intensity of light on the patient's face from zero to any intensity that may be desired through a wide range.

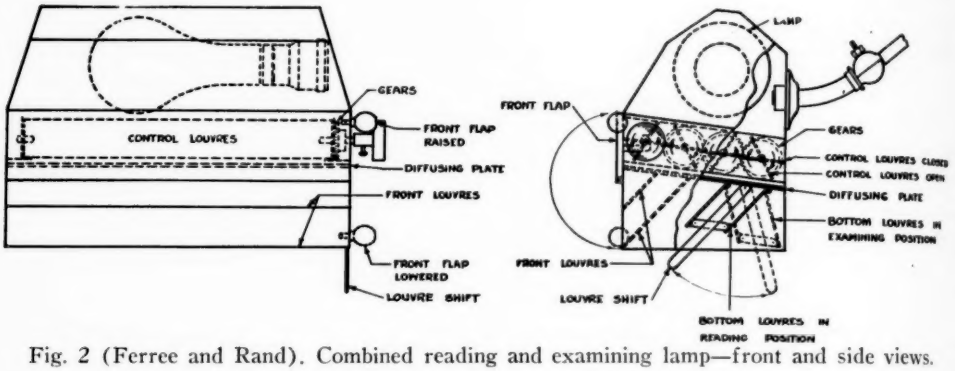

Fig. 2 (Ferree and Rand). Combined reading and examining lamp—front and side views.

If it is wanted to make an examination of the patient's face during the night, the following procedure may be used. The unit is adjusted in position above the patient's head, the flap is turned down to close the front louvers, the bottom vanes are rotated into the vertical position and the intensity control is set at zero. At any time, then, one may turn on the light from the switch located in the hall or some other suitable place, go to the side of the bed, and, beginning at zero, turn the knob which rotates the vanes until the desired intensity is obtained. When the unit is used in this way the chance of disturbing the patient should be reduced to a minimum and at the same time it should be possible to make a very satisfactory examination.

A PORTABLE EXAMINING LAMP

In addition to the preceding units, it would seem that there would be a need for a smaller, more conveniently portable examining lamp that could easily be taken from bed to bed as needed. We have constructed a unit to meet this need which can be clamped on the head of the bed or supported in some other suitable way should clamping to the bed be not permissible or desirable. This unit is 8 inches long, 5½ inches high, and 5 inches deep. Since it is not intended for use as a reading lamp, neither the bottom nor the front vanes are provided. The rotating vanes for the variation of intensity are supplied, however, and the glass for the correction of the color of the light. In this unit provisions are made so that the glass can be easily changed. That is, in ordinary examination of the face for the coloration of the skin or in cases which produce mottling or skin discoloration, the full correction for color should be used and the higher intensities of light. However, when the important factor is not to disturb the patient, as in examination of the color of the lips, the whites of the eyes and the skin in comatose or near comatose conditions, the Whiterlite glass

should be used in connection with a minimum amount of light. Both kinds of glass should be double etched to give adequate diffusion of the light.

Summary

Three types of use are recognized for a bed lamp: (1) as a reading lamp in homes, hotels, and elsewhere, and in private rooms in hospitals; (2) as a reading lamp in hospital wards where the eyes of patients on the opposite side of the ward must be protected from glare; and (3) as a lamp for making various types of examination of a patient lying in bed.

Some of the requirements for good lighting by means of a bed lamp are: (1) the unit should be at a favorable distance from the face, the reading page, and the surface of the bed. This provides for a wide spread of illumination and eliminates the spotlight effect. (2) The light should be well diffused. This very greatly increases the spread of illumination and reduces the glare on the reading page and other surfaces to a minimum. (3) The eyes of the reader and all persons in the room should be protected from glare from the opening of the unit. (4) The unit should give a fair amount of general illumination to the room. This carries still further the beneficial effects of spread of illumination and is particularly needed when no other means of illuminating the room is employed, as is often desirable in the use of a bed lamp. In producing the wider spread of light the optimum effects are obtained, so far as the general illumination of the room and surrounding field is concerned, when the walls about midway between floor and ceiling receive the greatest amount of light and the brightness shades off gradually upwards and downwards.

In the four units described we believe we have conveniently and effectively satisfied the needs in a bed lamp as defined at the beginning of the paper. The lighting effects from the first model are almost unbelievably good to those who have had experience with the usual type of bed lamp. It should be a source of great help and comfort to the patient who must lie in bed, yet is able to read; and to those in health who are accustomed to reading in bed, it transforms a somewhat serious vice into a comparatively harmless indulgence, so far as lighting effects are concerned. The second and third models add to the features of the first the essentials of a ward light and an examining lamp with a very effective intensity control in continuous change from zero to full over a wide range and with or without color correction. The fourth model is designed as an examining lamp alone, an important feature of which is ease and convenience of change from bed to bed. It is smaller and lighter than the other two and can be clamped to the head of the bed when desired. It is provided with the intensity control noted above and with either full or partial correction to daylight color. Since it is not intended for reading and since the purpose of the examination requires that the light be received full on the patient's face, the glare-protecting louvers across the bottom are omitted. In this connection, however, the eyes of the patient are safeguarded against undue glare by the highly absorbing, etched daylight glass and by the intensity control which permits of short exposures and a suitable gradation of intensity of light. A report on these lamps is made with the hope and belief that they will be of significant service in the hospital and to the medical profession in caring for the eyes of their patients.

In a later paper a small glareless lamp will be described which can be detached from its wall support and carried to the foot of the bed for purposes of examination. This lamp is provided with a means

of taking up the slack in the lampcord that is free from the objections which may be offered to the usual reeling devices.

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STUDIES ON INCLUSION BLENNORRHEA*

I. CLINICAL AND GENERAL OBSERVATIONS

L. A. JULIANELLE, PH.D. AND A. C. LANGE, M.D.

INTRODUCTION

The expression "ophthalmia neonatorum" has been in universal usage over a long period of time to describe a wide assortment of infectious conjunctivitides. While now the different varieties of this general manifestation are usually ascribed to different specific organisms, the most important is unquestionably the gonococcus, because of both its highest frequency and its usual severity with possible complications. Among these conjunctivitides, however, there still remains a condition, specific in its own right, which, failing to receive general recognition as a clinical entity, is only partially understood by the clinician and bacteriologist alike. While two to three decades ago ophthalmological literature persistently and persuasively emphasized this special form of conjunctivitis and designated it as inclusion blennorrhea, inclusion conjunctivitis, and so forth, the information concerning this disease is still meager and in need of confirmation in some cases and of amplification in others. The recent clinical reviews by Aust,[1] Morax,[2] Lumbroso,[3] and Thygeson and Mengert[4] have stressed this point of view, and the authors have tried to integrate to a greater or lesser extent the clinically allied diseases. The later etiological studies of Thygeson[5, 6] and of Thygeson and Mengert,[4] confirming and extending observations of earlier workers, as will be brought out later, have accomplished a great deal in clarifying the nature of inclusion blennorrhea.

While pursuing an investigation on the etiology of trachoma in this laboratory, it became immediately obvious, as others have indicated in the past, that these two conditions possess several characteristics in common. Consequently, in attempting a clearer elucidation of trachoma, it was inevitable that an answer should be sought

* From the Departments of Bacteriology and Ophthalmology, Washington University School of Medicine. Conducted under a grant from the Commonwealth Fund of New York.

to the inquiries arising in regard to inclusion blennorrhea. This study has now been completed, and certain conclusions have been reached concerning both the character and the etiology of the disease. It is proposed, therefore, to review in this communication the clinical and general observations made during the study. In subsequent reports, detailed accounts will be given of the transmissibility of inclusion blennorrhea, and certain etiological considerations will be submitted and discussed.

Historical sketch

It is clear that by accepted derivation and connotation "blennorrhea" implies gonococcal infection, although it was not until after Neisser's[7] demonstration of the gram-negative diplococcus in the exudate from urethritis and in the conjunctival discharge of infants, as verified by others,[8, 9] that the two ideas became regularly associated.[10–12] Later, with the introduction of differential and more precise methods of diagnosis, a number of other bacteria were recognized as etiologically related to the conjunctivitides of the newborn. Thus, the more common organisms, as pneumococcus,[13] staphylococcus,[14] streptococcus,[11, 15] Koch-Weeks bacillus,[11, 15, 16] Morax-Axenfeld bacillus,[17] and others, were identified, and accordingly the different varieties of conjunctivitis became classifiable. In spite of this rapid accumulation of information, however, there were repeated instances of so-called blennorrhea in which no bacteria were demonstrable by smear or culture. While certain authors considered the cases still due to gonococcal infection in which the organisms were too few to be seen, others speculated on the possibility of an entirely different causal agent, so that Morax[18] concluded, for example, that on such occasions the infection was "amicrobienne," thereby applying a name to a condition recognized as far back as 1884 but up until then remaining innominate.[8, 9, 10]

Following upon the discovery by Halberstädter and Prowazek,[19] in 1907, that the epithelial cells of the conjunctiva in trachoma contained particulate structures now identified as inclusions, it was perhaps a natural sequence that a search for similar cellular constituents would ensue in the "amicrobienne" instances of blennorrhea. And so it was that Stargardt[20] first reported that morphologically identical inclusions were indeed present in these cases. At about the same time, Schmeichler[21] made a similar announcement, both observers receiving rapid confirmation from Heymann,[22] who, however, observed inclusion bodies in 10 of 14 cases of gonococcal conjunctivitis. With Heymann's observations, together with the earlier concept that blennorrhea was a gonococcal infection, it now became a question whether the epithelial-cell inclusion actually represented a reaction of the cell in response to the gonococcus. In fact, Herzog[23] went so far as to postulate that in both trachoma and inclusion blennorrhea the inclusion is composed of gonococci differing from the normal variety through a process of involution during which they were transformed into microgonococci peculiarly adaptable to parasitism to the epithelial cell and capable of propagation on artificial culture medium. In more recent years, this postulate has been revived by Fodor[24] on evidence as lacking in conviction as that suggested by Herzog.

In a series of papers which did much to clarify the earlier perplexities, Lindner was able to establish a number of interesting facts. Studying a large number of patients, he found inclusion bodies regularly, only four times simultaneously present with gonococci.[25] He transmitted inclusion blennorrhea to the *Macacus*

rhesus and baboon,[26] results later repeated by several workers, and he showed that gonococcus conjunctivitis, on the contrary, was not transmissible.[27] Consequently, he recommended that blennorrhea manifesting epithelial-cell inclusions be designated as "inclusion blennorrhea" (*Einschluss blennorrhöe*[25]).

That the disease might be the conjunctival counterpart of a genito-urinary or venereal infection was investigated by Halberstädter and Prowazek,[28] who demonstrated that typical inclusions might be found in the genital epithelium of mothers bearing infected infants. This was immediately confirmed by Heymann,[29] and in rapid succession Lindner[30] not only found inclusions in nonspecific urethritis but with Fritsch and Hofstätter[31] transmitted the infection to a baboon by conjunctival inoculation of the urethral exudate and demonstrated the appearance of inclusion bodies in the conjunctival cells of the infected baboon. He considered the inclusion body to be indistinguishable from that of trachoma but nevertheless causally related to inclusion blennorrhea. Lindner later[32] advanced the hypothesis that both diseases are manifestations of the same agent, which attacks essentially the genital epithelium, but becomes adapted to the conjunctiva and causes inclusion blennorrhea. By successive passage from eye to eye, however, the agent undergoes an adaptation to the conjunctiva and thereby induces trachoma. Lindner still adheres to this concept and only recently[33] reclassified the two diseases as trachoma and paratrachoma.

It only remains to state in this short historical treatment that Botteri[34] and Gebb[35] reported that the agent of inclusion blennorrhea is filterable on the basis of single experiments in which filtrates obtained with Berkefeld filters were able to induce specific experimental infection. It is not desirable, however, to review here the literature bearing on etiology of the disease, since it will be done more appropriately in a subsequent communication.

In summary, then, it may be stated that past workers have shown that the blennorrhea of infants may be divided etiologically into gonococcal conjunctivitis and inclusion blennorrhea. As in the case of the former, the latter condition also arises as the result of a venereal infection transmitted from mother to offspring. Accompanied by the appearance of inclusion bodies in the adult genital epithelium and in the conjunctival epithelium of the infant, the disease is transmitted by an agent capable of traversing Berkefeld filters. Other essential differences from gonococcal conjunctivitis are transmissibility to monkeys and apes and resistance to silver therapy.

Symptomology and course of inclusion blennorrhea

The patients to be reported upon in this communication have come under observation during the past five years and comprise a total of 22. Of these, five came by way of the Saint Louis Maternity Hospital, and the remainder from the Ophthalmologic Clinic at Washington University, the patients in both instances representing the total detected by careful search for this disease in the two institutions during the interval stated. To Dr. L. T. Post credit must be given for making available the patients and facilities of his clinic and in every way encouraging this investigation.

In presenting the data, it has been found convenient to tabulate the more important information on each patient (table 1), but it will probably facilitate analysis and discussion to consider the observations more as a generalization in the form of a summary, pointing out the

exceptions and deviations wherever necessary.

For purposes of contrast and comparison, a table has been arranged in which similar data have been collected from reports of other workers (table 2). In addition to the authors included in this table, others also[41, 42] have made studies of inclusion blennorrhea, but, since their observations did not include the detailed information sought, they have been excluded.

Period of incubation. The interval postpartum before clinical signs were first observed varied in different infants from 3 to 12 days. In one patient the infection became apparent on the 3d day; in one, on the 4th day; in four, on the 5th day; in five, on the 6th day; in five, on the 7th day; in one, on the 8th day; in one, on the 9th day; in two, on the 10th day; in one each, on the 11th and 12th days. Thus, it is seen that, while variable, the period of incubation averages about seven days and, in fact, occurs in considerably more than half the patients within the first week following birth. This period, then, is prolonged as compared with that seen in gonococcal conjunctivitis (usually 48, occasionally 72 hours), and is in accord with the observations reported upon by other workers (see table 2).

Character of onset. Lindner,[27] Aust,[1] and Lumbroso[3] particularly have emphasized the occurrence of a prodromal stage in the evolution of inclusion blennorrhea.

TABLE 1

SUMMARIZED SYMPTOMOLOGY OF INCLUSION BLENNORRHEA AS OBSERVED IN 22 PATIENTS

Patient			Clinical signs				
Number	Race	Sex	Incubation (days)	Character of Onset	Duration Acute Stage	Sequelae	Recurrence
1	White	M	3	subacute, O.U.	1 week	none	none
2	Negro	F	5	acute, O.U.	2 weeks	none	none
3	White	M	7	acute, monocular	5 days	none	none
4	White	M	6	acute, O.U.	5 days	none	none
5	Negro	M	11	subacute, O.U.	10 days	none	none
6	White	F	7	acute, O.U.	1 week	none	none
7	White	F	6	acute, O.U.	3 weeks	none	none
8	White	F	4	acute, O.U.	1 week	none	none
9	White	F	5	acute, O.U.	2 weeks	none	none
10	Negro	F	10	acute, O.U.	3 weeks	none	none
11	Negro	F	7	acute, O.U.	1 week	none	Exacerbation
12	Negro	M	8	acute, O.U.	5 days	none	none
13	Negro	F	9	acute, O.D. first; O.S., 3 days later	2 weeks	none	none
14	White	F	10	acute, O.U.	2 weeks	none	none
15	White	F	5	acute, O.D. first; O.S., 7 days later	2 weeks	none	Exacerbation
16	White	F	6	acute, O.U.	2 weeks	none	none
17	White	F	12	acute, O.D. first; O.S., 5 days later	10 days	none	none
18	Negro	M	6	acute, O.D. first; O.S., 5 days later	12 days	none	none
19	White	F	7	acute, O.U.	8 days	none	none
20	White	F	5	acute, monocular	1 week	none	Exacerbation
21	White	F	6	acute, O.U.	11 days	none	none
22	White	M	7	acute, O.U.	10 days	none	none

Cases 1 and 5, starting subacutely, rapidly became acute.

O.U. indicates infection appeared simultaneously in both eyes; in some cases, infection appeared in one eye first and subsequently extended to other eye; in cases 3 and 20, the disease remained limited to one eye, hence designated as monocular.

According to them, this may last several days and is characterized by hyperemia and catarrhal inflammation. Thygeson[6] also calls attention to the fact that in six of his patients the onset was subacute; so, also, in two of the patients reported here. As a general rule, however, the disease starts suddenly and explosively, being typified by a rapid and severe inflammation accompanied by more or less profuse muco-purulent exudate and with the lids frequently agglutinated by the thick discharge. In any case, the infection soon becomes acute. In the majority of instances, the disease appears simultaneously in both eyes. The conjunctivitis sometimes manifests itself in one eye first, so that of the 22 patients seen, 4 started with a unilateral infection which extended to the other eye in intervals of three to seven days. While in a general way other observers have experienced similar results, a glance at table 2 indicates that the individual figures show great statistical variations. On the other hand, inclusion blenorrhea may be a monocular disease, as determined by its occurrence in two patients in the present series. Usually an infrequent manifestation, it was observed in a relatively large proportion by both Lindner[27] and Hamburger.[40] Whether monocular or bilateral, inclusion blennorrhea nevertheless exhibits a similar onset and course.

Course of infection. Initiated usually suddenly or following a short prodromal period, the disease presents an acute stage which may persist up to three weeks. While our own observations varied from five days to three weeks, it will be noticed (table 1) that in general the acute stage subsides after one to two weeks. This agrees with other observations, except for those of Lumbroso,[8] who gives up to 75 days as maximum duration. While the severity of the individual infection may vary, the following may be considered a typical description of the acute stage: During this interval, there is marked chemosis of the lids and infiltration of the conjunctiva, particularly prominent in the lower lids and fornices. Of the two, the lower conjunctiva appears more involved, presenting longitudinal ridges

TABLE 2

COLLECTED DATA ON CLINICAL MANIFESTATIONS OF INCLUSION BLENNORRHEA

Observer	Date	Number of Patients Observed	Clinical manifestations							
			Incubation	Number of Patients with Infection			Duration of		Sequelae		
				Monocular	Bilateral	Starting in 1 eye	Acute stage	Chronic stage	Recurrence	Scar tissue	Corneal reaction
Lindner[27,31]	1911	53	5 to 14 days	23*	27*	n.s.	1–2 weeks	3–6 months	n.s.	8 of 12	none
Noguchi & Cohen[37]	1911	6	4 to 14 days	none	6	none	1 week	2 months	n.s.	none	none
Morax, Lindner & Bollack[38]	1911	9	5 to 12 days	2	1	6	n.s.	6 weeks or more	n.s.	n.s.	n.s.
Botteri[34]	1912	22	5 to 12 days	none	14	8	1–2 weeks	up to 12 weeks and more	n.s.	none	none
Aust[1]	1929	21	7 to 12 days	n.s.	n.s.	n.s.	1 week	8 weeks to 3 months	n.s.	majority	none
James[31]	1931	4	5 to 13 days	none	4	none	5–7 days	4–6 months	n.s.	none	none
Lumbroso[8]	1933	14	6 to 40 days	none	8	6	3–75 days	up to a year or more	5	present	none
Hamburger[40]	1934	41	3 to 14 days	14	16	11	n.s.	n.s.	n.s.	n.s.	n.s.
Thygeson[4,5,6]	1934–6	21	4 to 10 days	1	15	5	1–3 weeks	5 months to 1 year	n.s.	none	none
Present report	1938	22	3 to 12 days	2	16	4	1–2 weeks	up to 6 months	3	none	none

* The discrepancy between these figures and the total is explained by the fact that 3 cases presented a mixed infection.
n.s. = not stated.
Other observers, in studying particularly the etiology of this disease, have given short generalized descriptions, and the data desired for this protocol were not available; thus, Heymann, Taborisky, etc.

reminiscent of the intestinal mucosa. The upper tarsus rarely exhibits any degree of inflammatory reaction. The conjunctiva of both lids undergoes severe papillary hyertrophy, and in the more pronounced infections, transient pseudomembrane may be detected. The exudate, which is thick and profuse, is composed for the most part of polymorphonuclear cells with occasional lymphocytes, monocytes, and desquamating epithelial cells. Thus, it is obvious that during the acute phase, the general appearance may be not unlike that of gonorrheal conjunctivitis, from which a clinical differentiation is sometimes possible on the basis of greater involvement of the lower lid and the extended period of incubation.

From the acute stage, the disease gradually submerges into a chronic stage. At this time, there is a diminution of chemosis, infiltration, and exudation. The papillary hypertrophy becomes less prominent and, in turn, may give rise to minute, pinhead follicles. The chronic stage persists in different infants for intervals varying from a few weeks to months, and, according to some authors, even longer than a year. It was not possible to determine the duration accurately in the patients reported here. Being, as they were, clinic patients, it was difficult to compel examination after the infection gave evidence of definite healing.

No complications or sequelae were observed in the infants reported upon in this communication. The cornea invariably remained free of infiltration, vascularization, or keratitis, thus giving no clinical evidence of involvement. While some of the patients were not followed as long as desired, nevertheless there was no trace of cicatrization seen in the conjunctiva, even in those undergoing grattage for therapeutic purposes, as will be described below. This corroborates the observations of other workers, except Lindner,[27] Aust,[1] and Lumbroso,[3] who call attention to a mild superficial scarring in only certain of their patients. It is interesting to add, however, that Aust is of the impression that the scarring developing in inclusion blennorrhea is dependent upon the intense inflammation accompanying the disease rather than upon a cicatrigenic action of the causative agent. Aust states, moreover, that cicatrization is associated with the pseudomembrane of the acute stage, since he observed ultimate scarring only in such cases. This, however, does not coincide with observations of Noguchi and Cohen,[37] Thygeson,[6] and ourselves, who, having seen pseudomembrane, subsequently detected no scarring.

In the clinical review of his patients, Lumbroso[3] has made a special point of spontaneous recurrence of symptoms after apparent healing. Thus, of 14 patients studied, seven suffered a recrudescence of the disease. Since other authors have not commented on this phenomenon, it seems reasonable to assume that recurrences did not occur in their patients. Of the patients reported upon here, three suffered what may be more accurately described as exacerbative reactions. All three were in the chronic stage, apparently improving but not arrested, when for no determinable reason there was a sudden recurrence of the acute stage. In one patient (no. 11), the chronic stage had continued for a month when the exacerbation occurred and persisted for two months before subsiding again into the chronic phase. In another patient (no. 15), the chronic disease of a week's duration was precipitated reversely into the acute stage, and after five days returned once more to the chronic form. In the third patient (no. 20), a similar experience was observed, occurring in the second week of the chronic stage and persisting for one week. How common this phenomenon may be is difficult to say

from the available information of other workers, but it may well be that genuine recurrence (Lumbroso) or exacerbation constitutes only a rare manifestation of inclusion blennorrhea.

Differential diagnosis. The fact that inclusion blennorrhea was not recognized until after the discovery of the epithelial-cell inclusion, described by Halberstädter and Prowazek, is ample testimony of its clinical similarity to the other acute conjunctivitides of the newborn. With the demonstration of this structure, the clinical manifestations of the disease have become better, if not perfectly, recognized. While, therefore, clinical observation should never be the only means of diagnosis, there are, nevertheless, certain signs which are helpful in differentiation. Inclusion blennorrhea is most likely to be confused with gonococcal conjunctivitis, from which it may be distinguished first of all by its prolonged period of incubation. During the acute stage, inclusion blennorrhea is characterized by greater involvement of the lower lids, the appearance of longitudinal rugosities of the conjunctiva, more benign nature of the conjunctivitis, and absence of corneal invasion even in untreated individuals—all manifestations usually unshared by gonococcal ophthalmia. The clinical history eliminating Neisserian infection in the parents and the customary instillation in the newborn of $AgNO_3$ preventive of gonococcus may be additional evidence in favor of a diagnosis of inclusion blennorrhea. Encountering infants in the chronic stage of the disease, trachoma may be differentiated on the basis of clinical history and the presence or absence of trachoma in any of the immediate family. In any case, however, clinical observation and diagnosis is only as reliable as the clinician in charge of the patient, and even under the best of conditions clinical differentiation at times becomes difficult if not impossible. Consequently, it cannot be stated too emphatically that a search should always be made for the presence of inclusion bodies to give authority and conviction to the clinical diagnosis. Our own observations agree with those of other workers that inclusion bodies are invariably present during the course of inclusion blennorrhea. In those instances where mixed infection is caused by both the gonococcus and the agent of inclusion blennorrhea, only microscopical examination can reveal the condition.

Demonstration of inclusion. Because it may be desirable for the physician to make his own examinations for inclusions and thus furnish himself with a valuable confirmatory diagnosis, it may be helpful to supply a simple method for the preparation and examination of material. Many variations in technique have been recommended by different workers, but there is little necessity for reviewing them now, since all that is important is to describe a rapid and facile method. The conjunctival sac is irrigated with saline solution, and local anesthesia is induced with a drop or two of holocaine or pontocain. The lids are everted in turn, and material obtained from the more involved surface of the eye. This is accomplished by first sponging gently with gauze, and then carrying a relatively dull instrument (Lindner spatula or the dull edge of a small scalpel) over the conjunctiva, scraping the surface so as barely to draw blood. The scraped material is then distributed thinly and evenly over slides.

The preparations are fixed by passing through absolute alcohol and drying. Staining may be accomplished by any number of dyes, particularly nuclear stains, the end desired being a contrasting effect between the inclusion and the cell. For this reason, Giemsa stain is the one of popular choice, but we have found Wright's stain (Wellcome Laboratories) as employed for blood smears to be equally satisfactory, at the same time decreas-

ing the period of staining. Accordingly, several drops of this stain are transferred to the slide and, after one minute, sufficient distilled water is added to cause about a three- or four-fold dilution. Within five minutes the slide is washed with distilled water, drained, blotted, and dried.

Inclusions are most readily recognized in epithelial cells. They are seen as heterogeneous masses of individual elements lying in the cytoplasm, usually close to the nuclear margin. Appearing either as dark-blue-staining structures (initial body) of variable shapes and sizes, or as pink-staining, rodlike, or diplococcal elements (elementary body), they frequently agglomerate into masses composed of both bodies. Both constituents of the inclusion may be found extracellularly also, and with experience they are detectable as such, the elementary body more difficult to diagnose unless present in relative frequency. Particularly during the chronic stage and occasionally even earlier in the disease, the inclusions are not numerous, and consequently a long search is imperative before a report of their absence can be made.

Treatment. The failure of the Credé method to prevent inclusion blennorrhea indicates immediately the ineffectiveness of $AgNO_3$ in the treatment of this disease, which is a contradistinctive observation when compared with gonococcal conjunctivitis. In fact, it has been our experience that the antiseptics usually employed in the treatment of acute conjunctivitides are of no particular benefit and that inclusion blennorrhea is preëminently a self-limited disease, its retrogression independent of the treatment prescribed. Thus, patients have been treated with cold packs, saline irrigation, boric-acid wash, $AgNO_3$, protargol, optochin, and metaphen, some of the chemical agents administered singly and others with frequent applications of boric acid. It cannot be said that any improvement was ascribable to the agent employed. Symptomatically, as well as for comfort, cold pacts and irrigations repeated frequently were utilized successfully; but they did not influence the course of the infection. In the last eight cases, mild grattage as used in trachoma was practiced. In all the infants the conjunctiva was scraped to furnish material for diagnosis and experimental study, but this is not considered as grattage. In the latter instance, the operation was repeated two and three times at weekly intervals if necessary, and followed by irrigation with boric acid, cold packs, and daily administration of 0.25 percent optochin. While the number of patients treated in this way is obviously too few to warrant conclusions, it is our impression that grattage may prove to be a beneficial and effective means of therapy.

Epidemiological Aspects of Inclusion Blennorrhea

While cognizant of the fact that the number of patients observed is considerably smaller than desirable for purposes of epidemiological analysis, the data nevertheless appear to be sufficiently typical to permit plausible and suggestive, if not conclusive, speculations. It must be remembered, moreover, that the frequency of inclusion blennorrhea is extremely low, so that after five years' alert search in a large clinic and maternity hospital, only 22 cases have been encountered. Consequently, any attempt to accumulate an extended series of patients becomes unlikely of accomplishment. With the material available, then, it is proposed with a certain degree of trepidation and reservation to make the following suggestions rather than statements concerning the epidemiology of inclusion blennorrhea.

Relation to age. Inclusion blennorrhea occurs only in infants and within a short

interval following birth. The indications are that the disease arises by way of the genital tract of the mother, in whom the infection is, strictly speaking, venereal in origin. (The evidence for this statement must be delayed for a subsequent communication because it lends itself to more orderly presentation in a consideration of etiology.) In addition, the infection may occur as a conjunctivitis in adults, also, but curiously enough it presents somewhat different manifestations and is consequently recognized as a different clinical disease, swimming-bath conjunctivitis, as will be brought out in greater detail in a later publication. Inclusion blennorrhea, then, as an entity occurs only in the infant, for which reason presumably it is classified in most textbooks unsatisfactorily as *ophthalmia neonatorum*.

Relation to sex. Only Lumbroso[3] before us attempted to correlate the frequency of inclusion blennorrhea with sex. Without unduly emphasizing the observation, he nevertheless pointed out that 10 of 14 patients reported upon by him were females. He, therefore, rhetorically raises the question, "Does inclusion blennorrhea exhibit a preference for the feminine sex?" Analysis of our own data presented in table 1 discloses that 15 of the 22 patients tabulated were females. Recognizing the danger of stressing this point, since the numbers are small, like Lumbroso we can only speculate on the predisposition of the female to inclusion blennorrhea and leave the answer for the future to determine. In the meantime, whether failure to comment on a similar relationship by past workers may be interpreted as a fault in observance or an absence of such an association must also remain unanswered.

Relation to race. Despite hundreds of patients with trachoma examined in various parts of this country, not a single example was ever found in Negroes. Without intending to reprecipitate a discussion on the interminable question of the resistance of Negroes to trachoma, the statement may be made conservatively that, whatever the reason, trachoma is a rare condition among these people. Because of the obvious interest in the two diseases, alluded to above, it was natural to determine the incidence of inclusion blennorrhea in Negroes. So it will be seen (table 1) that of the 22 patients studied, seven were Negroes. Thus, it is sufficiently clear that the Negro is susceptible to inclusion blennorrhea. It should be added, moreover, that the disease may be of equal severity in colored and in white infants, and in fact one of the most refractory patients (no. 11) was a Negro. None of the past investigators offers any data on this interesting relationship. However, in passing, Thygeson[5, 6] commented in a different connection that three of the patients seen by him were Negroes, thus indicating that he also found the Negro susceptible.

Relation to family. It is no obscure fact that trachoma is in many respects a familial disease. While to a certain extent trachoma may be disseminated by way of of the school, the barrack, and so forth, the greatest problem is the spread from one member of the family to another. It was consequently interesting to determine the dissemination of inclusion blennorrhea among the families of the different patients. To be sure, the disease arises in the first place from the father or mother, but little information is obtainable to indicate its further spread in the family. Several instances have been reported of conjunctival infection in the mother shortly after the onset of inclusion blennorrhea in her recently born infant, and while it is likely that the maternal conjunctivitis was contracted from the infant, it is also possible that it was the result of auto-inoculation. In any event, a study of the families

of the patients reported upon here, most of whom had young brothers and sisters, revealed not a single occurrence of the disease in other members of the family. In most instances, the lack of spread cannot be ascribed to any great precautions exercised by the mothers. The evidence does not necessarily indicate a lack of familial disease; it may merely indicate that the age and stage of the patient permits successful isolation and therefore successful confinement of the disease to the individual infected. Or, again, this may suggest that inclusion blennorrhea is a disease of low-grade infectivity even during its most active phase, the acute stage. Germane to this theorization is the statement of Aust[1] that in the eight years of study and observations of patients with inclusion blennorrhea, never has he seen an illustration of the infection implanted in the mother or attendants through the intermediary of the infant.

It is interesting to add in this connection that patient no. 11 had a brother two-and-a-half years older, who apparently had also contracted inclusion blennorrhea as an infant.

Seasonal variation. Of all the investigations conducted in the past, only Thygeson[6] actually tabulated the incidence of inclusion blennorrhea on the basis of month-to-month variation. His statistics indicate, however, that there was as much scattering of patients throughout the year as might be anticipated from an analysis of only 19 cases. An attempt to correlate the frequency of the disease on a monthly basis in this laboratory led to a similar observation. Thus, the data reveal that the patients were distributed as follows:

Month	Patients	Month	Patients
January	none	July	1
February	none	August	none
March	2	September	2
April	5	October	3
May	2	November	3
June	3	December	1

Since the determining factor in the transmission of the disease is the presence of infection in the mother at the time of delivery, it was to be anticipated, perhaps, that fluctuations in incidence would be independent of season, but at least proof is now at hand. It may be stated, therefore, that unlike certain other conjunctivitides characterized by seasonal variations, inclusion blennorrhea is a perennial occurrence.

The Genital Origin of Inclusion Blennorrhea

That inclusion blennorrhea arises from the genital tract of the mother has been alluded to in the historical review given above. It will be necessary to return again to this phase of the infection in the report on the experimental studies, but in the meantime it is desirable to point out certain clinical aspects of this problem. As already indicated, typical inclusions in both the intra- and extracellular forms have been found in the preparations made from the vagina and cervix in the case of mothers with infants having inclusion blennorrhea. Also, such genital tissues have been found to be specifically infectious for monkeys and apes, and, more pertinently, even for the adult. Thygeson and Mengert[4] report an accidental inoculation of a gynecologist while curetting a patient. The physician soon gave signs of a typical conjunctivitis characterized by inclusions.

In only two of the mothers of the infants studied here was it possible to make physical examinations and obtain material from cervix and vagina. The result of both examinations disclosed no significant information, and the preparations studied apparently contained no inclusion bodies. Preparations were made from patients in the prenatal clinic also, without finding inclusions. The myriads of saprophytic bacteria present in the female geni-

tal tract precludes either an easy or a satisfactory search in most instances. Thygeson and Mengert[4] consider the cervical epithelium best suited for examination, and stress the diagnostic importance of elementary bodies.

In any case, the genital infection from which inclusion blennorrhea is derived must be an extremely mild process. Parents of infected infants have no complaints and in fact seem to be unaware of their condition. In a study of mothers of infected babies, Hamburger[40] reported that the majority noticed a distinct vaginal discharge during pregnancy. Thygeson and Mengert,[4] on the other hand, detected no sign of infection in mothers and considered the condition of little, if any, gynecological importance. In man, the urethritis must be of equal insignificance, despite occasional reports[4] of a mild discharge. It is probable that the infection is, moreover, self-limited and of relatively short duration. Most studies indicate that inclusion blennorrhea is found only in single infants of a family, which must imply a recovery of the mother between parturitions. Apparently, only Hamburger[40] and ourselves have observed inclusion blennorrhea in two children of one family.

In short, it may be said that while the evidence points to a uterine infection preceding childbirth and responsible for inclusion blennorrhea, it must be confessed that the maternal condition is gynecologically trivial, probably belonging to the class of "infection inapparente."

However, the implication is obvious that for every infant with inclusion blennorrhea there must be one adult, and more likely two, with genital infection.

Histological changes in inclusion blennorrhea

The histological changes induced during the course of inclusion blennorrhea have received but little attention from most workers, so that the literature on this subject is confined to a great extent to the tissue reactions observed in animals infected experimentally. Since the histology of the experimental disease, however, is not typical of inclusion blennorrhea, but rather common to various follicular infections of the conjunctiva, as will be shown in a later report, it goes without saying that such descriptions are scarcely relevant in a consideration of spontaneous, clinical inclusion blennorrhea. In defense of past workers, it must be said that the removal of conjunctiva and subcutaneous tissues in a benign disease does not justify the possible risk of permanent disfiguration due to the inevitable cicatrization attendant upon such a procedure. At least, this opinion has deterred us from undertaking such a project, although Lumbroso,[3] having removed small pieces of conjunctiva, found that the patients tolerated the manipulation "absolutely without harm." Despite our own deficiency in the study of human tissues, it seems desirable to review the descriptions of other workers, if only to make this communication comprehensive.

Apparently interested more in a histological differentiation from gonococcal conjunctivitis than in the tissue reactions of inclusion blennorrhea *per se*, Wolfrum[43] studied sections from different stages of the infection. In the more severe instances of inclusion blennorrhea, he found extensive, and in places complete, destruction of the epithelium, so that inclusion bodies were demonstrable in only occasional areas where the epithelium was still more or less preserved. In such areas, the inclusion bodies were numerous, and in fact so excessive in some of the epithelial cells as to cause them to rupture. On the surface of the conjunctival tissue, there was a certain degree of infiltration which caused macroscopically visible

patches; subepithelially, on the other hand, there was marked invasion by plasma cells and, to a less extent, by leucocytes. With repair, there was extensive regeneration of the epithelium, in some cases embracing a depth of several layers pushing into the subepithelial tissues. The absence of follicles, which Wolfrum considers a distinguishing feature from the histology of trachoma, is explained by him on the basis that the normal conjunctiva of infants is deficient in lymphoid tissue, indispensable in the formation of these alterations. In a later case, however, Wolfrum did find follicles. The absence of follicles probably indicates that the patients studied were still in the clinical stage of papillary hypertrophy and that in the more advanced disease, when follicles are grossly perceptible, they would also appear in sections of the tissue. Löhlein[44] also gives a summary description of histological changes which in essence are those contributed by Wolfrum.

In undertaking a study of the histological changes, Lumbroso[8] obtained small piece of the conjunctiva from the cul-de-sac, which in each instance revealed a marked hyperplasia. This procedure was pursued in 11 patients, varying from the 7th to the 425th day of the disease. Without attempting a detailed report of Lumbroso's observations, it is important only to point out the general character of the histological changes. Thus, then, examination of the sections disclosed that during the acute and subacute stages of early infection, the conjunctivitis is an inflammatory process which invades the epithelial layers, causing necrosis and obliteration of large areas of epithelium. At first limited to the *tunica propria* of the mucosa, the inflammatory reaction may penetrate to a great depth and thus include the subepithelial tissues. The blood vessels participate in the reaction, contributing hyperemia and exudation. The areas of degeneration and necrosis are localized in superficial, circumscribed zones which are in direct contact with the free surface.

After the acute stage, the inflammatory reaction is superseded by a subacute or subchronic transformation. Progressive repair of epithelium sets in with an invasion of histocytes and lymphocytes tending to form circumscribed nodules, or follicles, which involve a great portion of the conjunctiva. This is particularly true in the later stages of the disease. With healing, the follicles become surrounded by a delicate capsule of fibroblasts and in this way cicatrization is initiated.

Thygeson[5] also performed a biopsy, from the upper fornix of a single patient on the 43d day of the infection. At this time he found a dense, subepithelial infiltration with inflammatory cells, with plasma cells in predominance. The epithelium was invaded by polymorphonuclear cells, and, more superficially, occasional inclusions were present intracellularly. No follicles were found in the sections.

Thus it is seen that the response of the tissues predicates essentially an epitheliosis characterized by an inflammatory process which causes destruction and exfoliation of the epithelial cells. Rapidly invading the subepithelial tissues, the infection is then accompanied by a migration of lymphoid cells. Gradually subsiding, the inflammatory reaction gives way to chronic changes which, in turn, lead to follicle formation, provided the disease is of sufficiently long duration. In certain respects similar to both gonococcal infection and trachoma, inclusion blennorrhea retains sufficient individual characteristics to be distinguishable from the former diseases. From gonococcal conjunctivitis, the reaction of the tissues is

differentiated on the basis of more extensive destruction of epithelium in inclusion blennorrhea, and greater infiltration by plasma cells of the epithelial and subepithelial tissues, while in gonococcal conjunctivitis there is a predominance of polymorphonuclear cells rather than lymphoid cells. From trachoma, differentiation is not so sharply demarcated, the essential difference being either absence or diminution in number of follicles, depending upon the duration of the process in inclusion blennorrhea.

Discussion

A benign disease, in spite of the alarming symptoms at the onset, inclusion blennorrhea is an infectious process distinguishable from other examples of ophthalmia neonatorum. Apparently venereal in origin, the infection is transferred from mother to child *intra partum* and makes its first clinical appearance about a week after birth. While occasionally it may present a prodromal lag, it is characterized by two clinical stages, an acute and a chronic phase. To the experienced observer it is possible to make a clinical diagnosis, but if confirmation is desired, the presence of the inclusion body described by Halberstädter and Prowazek leaves no doubt as to the identity of the disease. It would be premature to discuss in this connection the possible relationships between inclusion blennorrhea and trachoma, since no evidence in this connection has been brought forward in this communication; yet there can be little doubt that the two conjunctivitides are clinically and etiologically similar, but not identical. Since this is a clinical review, however, it may be pertinent to mention the ineffectiveness in inclusion blennorrhea of $AgNO_3$ as either a preventive or a therapeutic agent, while in trachoma this compound is a popular choice in treatment.

The resistance of the infectious agent to different manipulations, as exemplified by therapeutic observation, accentuates the self-limitation of the disease. Whether grattage, as suggested earlier, may prove a beneficial adjunct in treatment of the patient must wait upon a larger number of cases. It may be relevant at this point to discuss the evidence for immunity, based entirely on clinical grounds. There is no doubt that both exacerbation and recurrence of infection may happen, indicating a possible absence or incompetency of immunity during late infection. Failure of reinfection after complete recovery, on the other hand, does not necessarily imply an increased resistance to the infectious agent. It may represent, instead, lack of contact with an agent not only relatively rare but also disseminated by an unusual route. As indicated in the introduction, morever, inclusion blennorrhea is an infantile response only, so that reinfection later in life would obviously manifest itself in a different form. The clinical evidence, therefore, suggests that there is no acquired immunity to inclusion blennorrhea. It will be shown in a future report that experimentally no immunity can be demonstrated following recovery from the disease.

While it is impossible to appraise the epidemiological observations because of the scarcity of patients, nevertheless there is an intimation of two possibly important suggestions. In the first place, there is an apparent frequency of infection in females as contrasted with males, and secondly, the disease occurs in Negroes as well as in whites.

Summary and conclusions

1. A clinical and general study has been made of 22 infants with inclusion blennorrhea.

2. Disease may show prodromal symptoms preceding the period of incubation,

which varies from the 3d to the 12th day *post partum*.

3. Following an acute stage of about one to three weeks, the disease becomes chronic and may endure for months and even beyond a year. In the acute stage there is severe papillary hypertrophy, predominantly of the lower lid, and usually a profuse exudate. In the chronic stage, there is considerable diminution in papillary hypertrophy and exudate, and minute follicles may make their appearance.

4. The infection is purely conjunctival, never invading the cornea, and according to certain authors may occasionally leave thin superficial scars.

5. Diagnosis may be verified by the presence of cytoplasmic inclusions of the epithelial cells, and, in fact, these structures may be observed even extracellularly.

6. The course of the disease is not influenced by the usual methods of therapy, and therefore grattage has been suggested as an expedient. Further study is required, however, to determine its efficacy.

7. Epidemiologically, the disease has been discussed. Its possible predominance in females, its occurrence in Negroes, and its incidence independent of season are suggested.

8. Inclusion blennorrhea is an ocular manifestation of a genital condition, most frequently passing as an "infection inapparente" of relatively short duration.

9. Histologically, the infection appears to be primarily an epitheliosis, accompanied at first by destruction of epithelium, infiltration by plasma cells of both epithelial and subepithelial tissues. Later, the changes represent a chronic reaction and follicles may begin to make an appearance.

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THE USE OF CADAVER AND ANIMAL EYES FOR TRAINING AND EXPERIENCE IN SURGERY*

DANIEL B. KIRBY, M.D. AND JOHN P. MACNIE, M.D.
New York

The use of cadavers for the study of the fundamental facts of anatomy is very old. The application of these principles by the performance of operations upon the cadaver still furnishes its students training and experience and is also useful in the development of new operative techniques. The results of teaching with this material by Dr. John M. Wheeler are well known.

Even in the large medical centers, sufficient cadaver material may not be available. The departments of anatomy need the bodies for dissection. The embalmed and injected subjects are not suitable for eye surgery because of the hardness of the tissues. Application through the medical school to the morgues may disclose fresh autopsy bodies which, because they are rejected by the anatomical department would otherwise serve no further useful purpose before burial. They are ideal for the eye surgeon and can be shared with the ear, bone, and other surgeons who are interested, thus reducing the expense involved.

Directly after the autopsy, the body should be placed in the refrigerator and lightly frozen. The attendant removes the body from the refrigerator a few hours before the surgeon wishes to begin work to permit partial thawing of the tissues. Then if the room is kept fairly cold between work periods, the material will be good for about two days. It will be best to replace the body in the refrigerator between sessions. The entire material of globe, orbits, and lids may well be used before decomposition of the tissues sets in.

Not all cadaver material is suitable for operations upon the eyeball itself. For intraocular work, it is best to resort to animal eyes. Monkey eyes would be ideal, but are rare and expensive. Dog, sheep, and pig eyes are too large and the tissues too heavy and thick. Kitten eyes are ideal,

* From the Institute of Ophthalmology of Presbyterian Hospital in the City of New York, Department of Ophthalmology, College of Physicians and Surgeons, Columbia University, New York.

as Fisher* has pointed out. The best age is from six to twelve weeks depending upon the size of the kitten. Those can be selected in which the size of the cornea is near that of the human. The diameter should not be less than 11 mm. and not over 14 mm. This will insure the proper thickness of cornea and sclera. One of the authors (D. B. K.) has adapted the Meyrowitz phantom operating mask for the purpose by first placing the excised kitten eye and orbital tissues in a perforated tongue clamp and then inserting this assembly in the orbit of the phantom operating mask.

The kittens are killed with illuminating gas and quickly removed from the lethal chamber to prevent the clouding of the cornea which develops if the eyes are allowed to remain partially open and exposed to the gas after death; or they are first anesthetized with ether and then killed by the injection of a small amount of ether or chloroform directly into the heart. There need be no complaint on the part of any one on the use of these animals for this purpose, as they are destroyed painlessly and are serving a very useful purpose. The American Society for the Prevention of Cruelty to Animals or the authorities of the other institutions where stray cats are put away painlessly with lethal gas may well coöperate for this purpose and, upon proper application, deliver up the dead bodies of these animals to physicians or to the authorities of medical schools or hospitals where instruction in eye surgery is being given. The material should be used promptly after death to insure the best results. If the eyes are slightly decomposed, the pigment epithelium softens and exfoliates, and the vitreous adheres to the lens. If fresh, the eyes are very satisfactory.

The method of removal of the eyes from the orbits is important. The skin should be incised with a sharp knife down the midline just between the eyes and all around the orbits at least one-half inch of skin from the margins. Then with

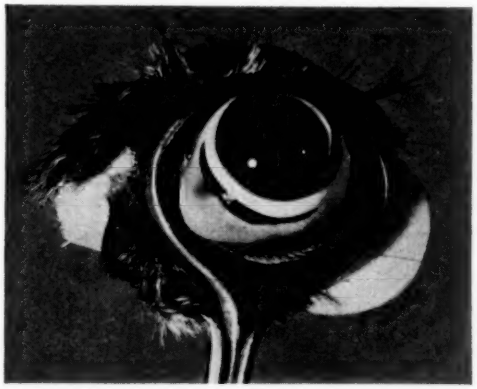

Fig. 1 (Kirby and Macnie). Assembly of kitten's eye in fenestrated tongue forceps.

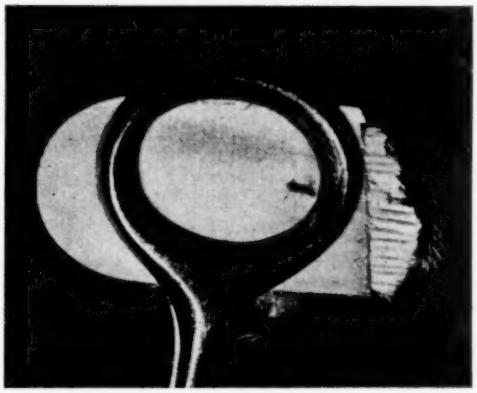

Fig. 2 (Kirby and Macnie). Back view of assembly showing the use of wooden tongue blade.

strong toothed forceps and curved scissors the loose subcutaneous tissues are dissected and finally all of the orbital contents removed with the globe. The palpebral fissure is slit at each end to permit the globe to prolapse through the opening. The specimen is then placed upon a short (about 1½ inches) piece of wooden tongue blade and secured in the hole of a tongue clamp, arranging the eye so that

* Fisher, W. A. Senile cataract. Chicago. H. G. Adair Printing Co., 1937.

it appears to be looking downwards. Enough but not too much tension should be placed upon the tissues by the grasp of the clamp. Then this whole assembly is placed in either the right or left side of the phantom operating mask and secured in position by strapping the handle of the tongue clamp to the median forehead bar

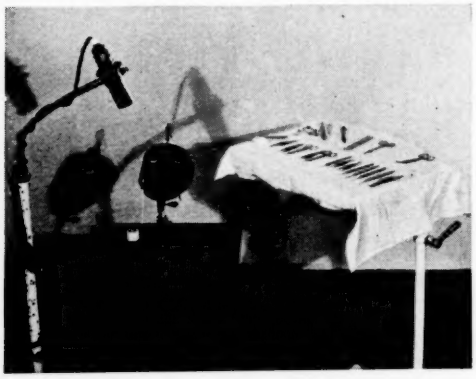

Fig. 3 (Kirby and Macnie). Front view of set-up of mask, table, instrument table, and lamp for animal-eye surgery.

of the mask. The material is then ready for operation. It is best to duplicate as far as possible the conditions of the regular operating room as regards lighting, arrangement of instruments on the tray, assistance, and everything else, for the full benefit of the man under training.

Cataracts may be produced in the specimens by refrigeration and further enhance their value. After the removal of the eyes and orbital contents from the dead animal body, the former are immediately put into Locke's solution, allowing about one ounce of solution for each specimen. The formula for Locke's solution is as follows:

Sodium chloride	gm.	0.09	= .9	percent
Calc. chloride		0.024	= .24	"
Potass. chloride		0.042	= .42	"
Sod. bicarbonate		0.02	= .2	"
Glucose		0.10	= 1.0	"
Dist. water		100.00		

Dissolve the salts in the order named and filter.

Place the jar with solution and specimens in the refrigerator and allow it to remain for six hours at a temperature about two degrees above freezing (35°F. or 2°C.). This part of the preparation of the material was worked out with the aid of Dr. Charles Marrin. After refrigeration, the specimens may be removed, ready for use, and will invariably show cataract formation. The opacity will remain while the eye is cold and will clear when the eye becomes warm.

Summary and conclusion

The use of cadaver and kitten eyes is invaluable for teaching, training, and experience in eye surgery. Such material properly preserved and prepared will be found to answer every purpose. The experience of the authors and associates in the preparation and use of cadaver and kitten eyes is given in detail.

NOTES, CASES, INSTRUMENTS

ANGIOID STREAKS IN THE OCULAR FUNDUS WITH TRAUMATIC RUPTURE OF THE CHOROID*

EVERETT L. GOAR, M.D.
Houston, Texas

The first description of a fundus with the condition now known as angioid streaks seems to have been made by Doyne in 1889.[1] Three years later Plange[2] reported a similar case, and Knapp[3] in the same volume also described the condition, calling it dark angioid streaks. Since then many cases have been recorded, and in 1927 Holloway[4] collected sixty cases including two of his own. He brought the literature up to date and published the most complete résumé and bibliography up to that time. Since then numerous articles have appeared until now the condition is quite well known.

The disease must be fairly common, although whereas I have made a diligent search of fundi for the past decade, this case is the only one of undoubted angioid streaks that I have encountered.† In personal conversation Dr. W. L. Benedict stated that he has seen several cases, and Dr. Grady Clay said that he has seen sixteen patients with the condition. It is probable that because of his well-known interest in angioid streaks, Dr. Clay's confrères have assisted him in his search for cases.

CASE REPORT

R. D. S., aged 27 years, a magazine vendor, consulted me on November 10, 1936. Four days previously he had been struck over the left eye in a brawl, and the sight in this eye had not been good since. Eight months before he had noticed that the vision in his right eye was not very good, but had paid little attention to it. His left eye had been all right until this accident, but after it he could not see well enough to carry on his work. His vision was R.E. 15/200, L.E. 15/200, corrected to 20/50 with a —1.25 D.sph. in the right eye, unimproved in the left. There was a residual ecchymosis about the lids of the left eye, but no other external signs of injury. The patient had had scarlet fever, measles, mumps, influenza, and several attacks of asthma. His father at the age of 65 years, and his mother at 55 were both living and well, as were also his three brothers. None of his relatives have any serious eye disease.

Description of fundi. Right: There was a grayish mottled zone around the disc, and radiating from this were several small serrated lines of a light-brown color lying beneath the retinal vessels. There were a few such streaks away from the disc, not connected with the circumpapillary area. These lines were much narrower than any of the retinal vessels in their vicinity. The disc itself was more vascular than usual, the central artery showing many branches upon the disc. At the termination of a macular arterial branch and just above the fovea was a darkly pigmented spot one-fourth disc diameter in size. There was no evidence of angiosclerosis in either eye. Left: The area around the disc was about as described in the right eye but the streaks were scarcer, only two being distinctly seen. There was a large flat hemorrhage in the macular region which extended well above it. Con-

* Read before the Texas Ophthalmological and Otolaryngological Society.

† While this subject was being discussed in Dallas, Dr. J. Guy Jones presented a man of 27 years who had typical angioid streaks with perfect vision and no other fundus changes.

tinuous with this was a fingerlike process extending nasally and connecting with a large extravasation below the disc. There were two small linear hemorrhages nasal to the disc.

Two weeks after the injury, a vertical white streak was noted in the left macular region, and as the blood became absorbed still more it assumed the shape of an inverted Y. This undoubtedly represented a rupture of the choroid which occurred at the time of the accident. At this time it was noticed that a fresh hemorrhage had occurred around the pigment spot in the right macula, and the corrected vision in this eye had dropped to 20/200. Since that time the chief changes that have occurred in the fundi have had to do with the absorption of the blood, some pigmentation along the ruptured choroid, and the appearance of two streaks in the left eye that were at first hidden by extravasated blood. Field studies showed a large central scotoma in the visual field of the right eye, and a large irregular paracentral scotoma in that of the left. A careful physical and laboratory examination by an internist showed nothing to account for the ocular disease. Examination by a dermatologist revealed no signs of pseudoxanthoma elasticum.

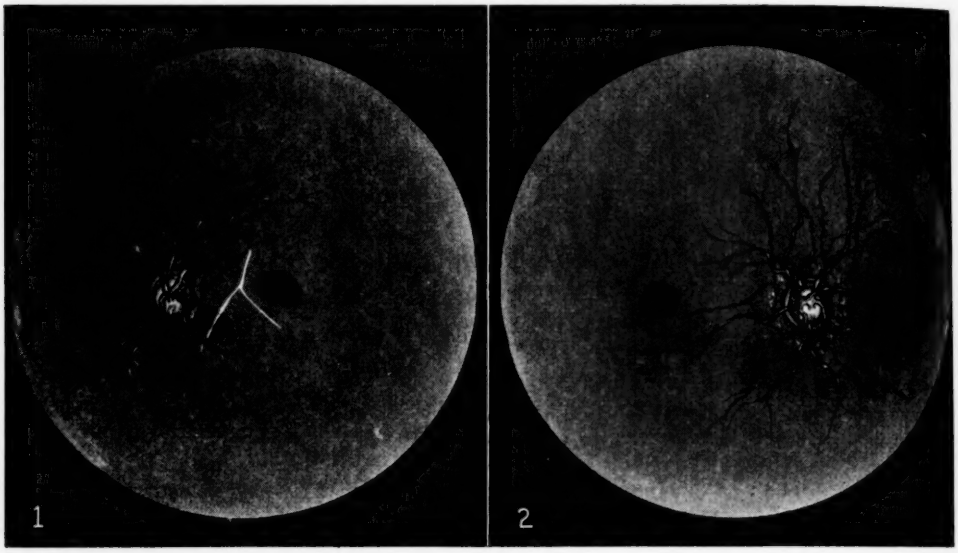

Fig. 1 (Goar). Left eye, showing partial absorption of hemorrhage, rupture of choroid, and streaks.
Fig. 2 (Goar). Right eye, showing fresh hemorrhage about pigment spot in macula.

Discussion

The etiology of angioid streaks is obscure, and there is no agreement concerning the pathology or pathogenesis. In certain case reports there seems to be a strong familial tendency, but in others there is none. No eye has ever been sectioned in which the condition was diagnosed with the ophthalmoscope prior to enucleation.

There are numerous theories in regard to the pathogenesis of these streaks, of which I shall mention only a few of the more plausible. Treacher Collins's[5] explanation is briefly as follows: The circle of Zinn is composed of the short posterior ciliary arteries which enter the sclera around the optic nerve and anastamose.

From this circle branches come forward to supply the posterior part of the choroid. Now, if for some reason a subchoroidal hemorrhage occurs, the blood becomes absorbed very slowly, is broken down, and insoluble crystals are formed. Due to ischemia produced in the choroid by the hemorrhage, the limiting membrane breaks down in spots, and the pigment comes forward through the areas where the rods and cones have disintegrated and groups around the perivascular lymph spaces of the short posterior ciliary arteries. This theory then places the streaks in the deeper layers of the choroid.

In 1928 Verhoeff[6] published an article entitled "The nature and pathogenesis of angioid streaks in the ocular fundus." He removed an eye because of absolute glaucoma that had never been examined with the ophthalmoscope. The other eye did not show angioid streaks but there was evidence of choroidal atrophy about the disc and abnormal pigment deposits. Grossly, the enucleated eye showed anastamosing dark streaks after the retina had been peeled off. Verhoeff states: "From the microscopic examination of the right eye it becomes evident that angioid streaks are really ridges resulting from puckering of the inner surface of the choroid. It is also evident that this puckering results from cicatricial contraction of the fibrous tissue which has replaced the deeper layer of the choroid while leaving the inner layers relatively uninvolved. That the ridges have a radial direction is readily understandable, since the latter acts as a fixed point. . . . Branching of the ridges was definitely demonstrated both macroscopically and microscopically. . . . As seen ophthalmoscopically, the ridges appear dark because they generally present three layers of pigment between the choroid and the observer."

Still other explanations of the streaks have been offered, such as hemorrhages in the choroid or in the deep layers of the retina, folding of the pigment layer due to exudative processes in the choroid, and splits in the lamina vitrea. Clay evolved a new theory and called attention anew to the frequent association of angioid streaks and pseudoxanthoma elasticum—an association too commonly found to be accidental. Clay's hypothesis is that the streaks are caused by thrombosis of anomalous short posterior ciliary veins, due to a fibrosis and loss of elasticity in the choroid—the same pathologic process that occurs in the skin in pseudoxanthoma elasticum. Benedict[7] thought he had the mystery solved when he obtained the eye from a patient that had typical angioid streaks in his other eye. The fundus of the enucleated eye could not be seen because of acute glaucoma. When examined grossly the posterior part of the choroid showed streaks radiating from the disc which appeared to be angioid in nature. However when the eye was sectioned, nothing in the way of streaks could be found. None of the theories of the cause of the streaks were proved by this examination, and none were refuted—the cause was simply not found by histologic examination. It seems likely that the true explanation of these streaks awaits the histologic examination of eyes in which they have been observed before enucleation, and with the recently awakened interest in the subject, this will undoubtedly come to pass soon. As far as theories are concerned, Verhoeff's seem to me to be the most acceptable.

Summary

While the pathogenesis of angioid streaks is unknown, there are a few facts that may be borne in mind when a patient with the condition is encountered.

The disease is usually at some stage accompanied by retinal hemorrhages and often by macular changes that diminish central vision. It is likely to be progressive, hence is a serious menace to sight. Usually there are no visible changes in the blood vessels, and it is not associated with vascular hypertension. The streaks are in the deep layers of the retina or in the choroid—probably the latter. No blood dyscrasia has been found in reported cases. In the case reported there were angioid streaks in each fundus with a traumatic rupture of the choroid in the better-seeing eye.

1304 Walker Avenue.

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CATARACT EXTRACTION IN SUBCLINICAL SCURVY

E. L. TAUBE, M.D.
Milwaukee, Wisconsin

Subclinical forms of scurvy have been recognized as a clinical entity for many years, and within recent years have been very well reviewed by Eddy and Dalldorf.[1] These writers point out the interesting fact, in discussing its frequency, that 20-25 percent among the poorer children of New York are affected by this condition. These cases are due to a hypovitaminosis, especially of vitamin C. They may have an asymptomatic stage or stages, for which two methods of diagnosis have been found: one with chemical studies of intake, excretion, and blood concentration; the other by methods designed to measure the hemorrhagic diathesis of the patient. In this regard the methods of testing for capillary fragility are used. Several tests for capillary fragility are available, the most common of which is the tourniquet test.

Cataract extraction in these cases of subclinical scurvy with increased capillary fragility are of importance, and, if possible, one should attempt to diagnose this condition before operation. With proper preoperative therapy one can readily get the patient in a proper state for the necessary surgery.

Case report. Mrs. P., aged 48 years, reported on September 20, 1937, that she had noticed progressively decreasing vision of the right eye for the last year. Examination revealed vision in the right eye limited to the ability to detect hand movements. There was good light perception and light projection. The left eye was normal. Her family physician, upon checking her physical condition, reported no pathological findings. The urine was normal; blood-coagulation time four minutes; bleeding time 2½ minutes; red blood cell count 4,750,000; white blood cell count 4,050; hemoglobin 95 percent; color index 1+; platelet count 320,000; neutrophiles 64 percent, lymphocytes 36 percent.

On September 29th removal of the cataract was decided upon. Quite a good deal of bleeding was encountered upon using the Van Lint anesthesia, but it was stopped with pressure. Upon putting in the superior-rectus suture a steady bleed-

ing was noted at the site of the suture. Pressure with pledgets of cotton soaked in adrenalin was of no avail and the oozing spread steadily under the conjunctiva from limbus to limbus, superiorly and inferiorly. A tight bandage was applied and the patient returned to her room without any further work done.

An internist (Dr. Enzer) was called in consultation. Questioning revealed the history that the patient had refrained totally from eating any fresh fruits or fresh meats for a period of over five years. She was over-weight and believed that this would keep her weight down. Examination of the body revealed several large scattered purpuric spots, most marked in the forearms. She had noticed their appearance and disappearance for over a year. The tourniquet test was markedly positive for capillary fragility.

The patient was put on an adequate diet of fresh fruit and fresh meat daily. Large feedings of orange juice[2] were given in accordance with recent writings. Large doses of cevitamic acid[3,4] (up to 500 mg. daily) were given over a period of four weeks.

On October 28, 1937, cataract extraction was again attempted. An extracapsular cataract extraction of the right eye was performed. There were no complications at the operation or postoperatively. With the necessary correction the final vision was 20/20.

612 Bankers Building.

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SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

CHICAGO OPHTHALMOLOGICAL SOCIETY

October 25, 1937
Dr. Thomas D. Allen, *president*

Exudative inflammatory lesion of the retina

Dr. Max Hirschfelder said that this boy, aged 7 years, had been shown before this Society one year ago with the possible diagnosis of tubercle of the choroid, glioma, Coats's disease, and exudative retinitis of unknown origin. The appearance had not changed during the past year. Floaters are present in the vitreous. In the temporal aspect of the retina, starting at the disc margin, there is a very large gray elevated mass, best seen with plus 8.00 D. Vessels run over it, and at the apex there is a small hemorrhage. Throughout the fundus glistening areas of cholesterin are seen in the retina. Peripheral to the mass and extending inferiorly is a broad band of white exudate which covers the retinal vessels in spots. Dr. Theobald and Dr. Gradle believed the lesion to be inflammatory, and in view of this fact the eye was not enucleated. The patient will be watched for a possible growth of the tumor. Tuberculin and blood-Wassermann tests are negative.

Complete luxation of the lens into the vitreous (bilateral)

Dr. Max Hirschfelder said that this patient, a woman aged 55 years, had had very poor vision in both eyes for about three years and stated that she had been nearsighted all her life. There is a cataractous lens at the bottom of each eyeball. In the right eye, a herniation of the vitreous and a hole in the macula are seen.

Contact lenses; a new technique for making impressions of the anterior segment (preliminary report)

Dr. William F. Moncreiff read a paper on this subject which will be published in this Journal.

Discussion. Dr. Robert von der Heydt said that improvements in contact-glass fitting are still in order and congratulated Dr. Moncreiff on his enthusiasm. The 3 percent of individuals who cannot be fitted with ordinary scleral radii may now be corrected with the Negocoll molding method, though there are new difficulties; for instance, the creation of the water space in the mold. After we have a perfect mold the determination of the outer surface is still a major problem.

Some individuals develop a lid spasm of such a degree that a pressure intolerance develops, and it may be impossible to wear a contact glass long. He had also had a case in which the lid tonus was so lax that it did not hold the glass against the eyeball with sufficient pressure. In cases of scleral astigmatism there is a similar difficulty. To correct this Zeiss now grinds contact glasses with any two differing scleral rim radii.

Dr. William F. Moncreiff said that Dr. von der Heydt had probably had more extensive experience in the use of contact glasses than most of them, and he appreciated his remarks on the subject. Of course what has been presented is a mere detail and not yet fully worked out, and there is much to be done even when satisfactory casts can be made by almost anyone with a reasonable amount of practice. After a satisfactory cast is made there is still the problem of the construction of the contact lens. It seems that if

eventually contact glasses are made generally available to patients with poor vision, it will be essential to manufacture them in the United States, and at considerably lower cost than at present.

The occurrence of divergence excess associated with vertical anomalies

Dr. James W. White, New York City, said that the inconvenience of a vertical deviation to a patient, be it diplopia or the discomfort of a muscle imbalance, is overcome in one or more of several ways, such as a headtilt, or a convergent or divergent strabismus.

A headtilt will frequently so enable one to fuse, that a lateral imbalance is entirely overcome. When a convergent strabismus is present, associated with a vertical imbalance, it is usually of the convergence-excess type. Duane reported cases of divergence insufficiency with a vertical imbalance as the primary cause, and Prangen likewise reports this as a frequent observation.

If a divergent strabismus is present due to a hyperphoria or hypertropia, it is most frequently seen as a primary convergence insufficiency. Many cases however begin as a divergence excess and may remain an uncomplicated divergence excess or may have added a secondary convergence insufficiency.

His paper dealt with primary divergence excess associated with a vertical imbalance. The vertical imbalance may be small in amount or may be considerable, may be a hyperphoria or a hypertropia, and may have some degree of headtilt. The most common complication observed was an added convergence insufficiency. The screen (cover) test was used to measure all cases of exotropia. It was also used in any degree of amblyopia and for children under six or seven years of age. The tests were made for distance, near, and in the six cardinal fields. The convergence near point was carefully taken. In cases in which there was any doubt as to the involvement of the elevator or depressor, the screen-comitance test was used to bring out primary and secondary deviations.

The tangent curtain may be made to determine the fields of diplopia. Because many patients suppress one image, or because of age or some other factor, the diplopia charts are not made routinely and when made are not relied on, if the screen and screen-comitance tests do not confirm the findings on the tangent curtain.

In the lower degrees of hyperphoria, the screen-Maddox rod test is a most searching test, if the lateral deviation is not too great.

Twelve cases were reported in children from two to ten years of age and a second group of 12 cases in adults. The onset in the first group was at two to four years of age. At a distance of 20 feet or beyond, there was usually an exotropia, which at times changed to an exophoria, especially when the subject was concentrating. For near, an exophoria of a lesser degree was present with a normal convergence near point. In the second group a larger number had superadded a convergence insufficiency. A greater number of exotropias began as a convergence insufficiency when a vertical anomaly was present, but these were not included in the paper.

Treatment included a consideration of the ametropia and correction of the vertical anomaly by prism if the hyperphoria was comitant enough to make this possible. Fusion training and prism convergence exercises are of benefit chiefly in preventing the development of a convergence insufficiency and by improving the convergence near point. Surgical treatment should be directed toward both

the divergence and the vertical anomaly. If the vertical anomaly is over 10 centrads and noncomitant, it is usually better to correct the vertical deviation before operating for the exophoria, as the correction of a hypertropia will often lessen the amount of the divergence. When the divergent squint is considerable and the hypertropia is less than 10 centrads and especially if comitant, the lateral deviation should be corrected first.

Since the cases were all of a primary divergence excess, the operation of choice was a recession or tenotomy of one or both externi, depending on the amount of exotropia and the character of the convergence near point. If the convergence near point was remote and not well held, the internus of the diverging eye was resected in addition to effecting recession of the externus.

CONCERNING THE PATHOLOGY OF GLAUCOMA

DR. T. L. TERRY, Boston, read a paper on this subject which will be published later.

Robert von der Heydt

COLLEGE OF PHYSICIANS OF PHILADELPHIA

SECTION ON OPHTHALMOLOGY

October, 1937

DR. CHARLES R. HEED, *chairman*

SUBCHOROIDAL HEMORRHAGE SURROUNDING THE OPTIC NERVE

DR. E. GIRARD SMITH said that his patient was admitted to the University Hospital on October 14, 1937, complaining of distortion of objects when viewed with the right eye.

About September 1st the patient suddenly had noticed that objects viewed with the right eye were smaller than those viewed with the left. There were no other suggestive symptoms. Five months prior to admission, the patient had been in an automobile accident and remembered being taken to another hospital, where a large gash over the right temple was sutured. Recovery was uneventful. On admission to this hospital vision was O.D. 6/30, O.S. 6/6.5. Physical examination showed a large scar over the right temporal region. External examination of the eyes was negative. Surrounding the inferior nasal and inferior temporal parts of the disc of the right eye was a slate-colored area extending outward approximately one to two disc diameters. Around this slate-colored area were hemorrhages which were striated and apparently in the deeper layers of the retina. The retina over the previously described area was raised about 1½ diopters, and there were traction bands running toward the macula.

X-ray studies of the skull were negative. The spinal pressure was 170 mm. of water; spinal-fluid protein 45.25 mg. There were no blood cells in the spinal fluid. The serology was negative. A central field showed an enlarged blind spot and a large cut in the temporal field to 1/1000 white. It was thought that the patient might have a chronic subdural hemorrhage, and he was seen by Dr. Francis Grant, who was unable to find any confirming signs.

This patient was presented because of the diagnostic problem. The fundus lesion could be due to a sarcoma, but this is rather unlikely. Dr. Smith believed the slate-colored area below the disc to be due to blood in the subchoroidal space which had traveled along the sheath of the optic nerve. It is interesting to note that the patient's accident, which is the only apparent factor to be considered, occurred five months previously. During the patient's stay in the University Hospital,

the hemorrhages in the deep retinal layers had gradually become absorbed and the subchoroidal hemorrhages appeared to be traveling downward.

Discussion. Dr. Francis Adler said this case represents a subdural hemorrhage which came down the optic-nerve sheaths and finally presented itself at the disc. We were particularly interested to know what the field defect from such a lesion might be. It has been thought by some writers that the field defect in choroiditis juxtapapillaris indicates that this disease starts in the optic-nerve sheaths close to the disc, and hence give rise to nerve-fiber-bundle defects. On this basis, we should have had a nerve-fiber-bundle field defect in this case. Such, however, was not the case, the field defect representing an involvement of a large portion of the retina. It is rather curious that it took the hemorrhage so long to make its appearance. As it spread out in the choroid it caused a flat detachment of the retina and choroid. The only other diagnostic possibility would seem to be that of a tumor in this region, and the eye will have to be carefully watched.

Exhibition of a case of detachment of the retina treated successfully with the thermophore (résumé of a series of five cases so treated)

Dr. H. Maxwell Langdon read a paper on this subject which was published in this Journal (May, 1938).

Discussion. Dr. Langdon, in conclusion, said that the interesting question of myopia came up in the last case reported. Insurance was carried by the patient and the company stated that myopic persons are susceptible to detachment of the retina. The patient had only one diopter of myopia. Dr. Dunnington of New York published 220 cases, of which 66 percent had myopia.

Buphthalmos with nevus flammeus

Dr. Carroll R. Mullen said that nevus flammeus associated with glaucoma is of rare occurrence. About 67 cases have been reported since the condition was first described by Schirmer in 1860.

An excellent and most complete review of the reported cases was presented in 1933 by C. S. O'Brien and W. C. Porter of the University of Iowa. More recently, Mehney of the University of Michigan covered the known evidence of this condition in reporting an additional case.

It will not be necessary to digest these reviews because the published reports are readily available and remain rather fresh in our minds from repetition in the past four years. Briefly it may be pointed out that glaucoma can be looked for in cases of facial nevus which involves the lids, conjunctiva, episclera, iris, choroid, and other ocular structures. It is usually of the infantile type, for O'Brien and Porter found 38 in their total of 56 known cases. It has also been noted that the glaucoma has been unilateral in practically all cases. Intracranial changes are often associated with this condition.

Miss T. B., a white woman, native and resident of South Carolina, presented herself at the clinic of Dr. Thomas A. O'Brien in the Wills Hospital during August, 1937. She was single, aged 22 years, and gave her occupation as that of a saleslady. She was mentally alert and appeared equal with others of her age. The history of her condition recorded that the port-wine birthmark and protrusion of the right eye had been present since birth. She could not recall that vision had ever been present in this eye, nor did it ever pain her, although she observed that at times it "aches and feels tight."

This patient has three brothers. No history of the appearance of nevi in any member of her family is known to

her, nor that any of her immediate relatives have had trouble with their eyes. In 1931 or 1932 she received four or five treatments with radium but no effect upon the nevus was observed.

No light perception was present in the involved right eye. Visual acuity of the left eye was 6/9.

The external examination showed a port-wine-colored nevus involving the right half of the face, includng the eyelids, nose, and upper lip. The right globe was enlarged; it protruded and diverged 30 degrees. Tension of this eye was recorded as 66 mm. (Schiötz). With an exophthalmometer the proptosis of the right eye measured 35 mm., and 13 mm. for its fellow. Slight upward, downward, and lateral excursions could be elicited in this globe but it could not rotate medially past its mid-line. The cornea of the right eye measured 15 mm. in transverse diameter, against 10 mm. for the left eye. A conical cornea was also in evidence, together with a deep anterior chamber and a well-dilated and fixed pupil.

External examination of the involved left eye was apparently normal. Confrontation fields were full and normal.

The ophthalmoscopic study of the right eye showed that the media were not clear, due to some central corneal changes and many fine linear but closely packed lenticular opacities, which extended from the periphery to meet at the lens center. A red fundus reflex was present, but because of the haze no detail could be made out, other than that the disc appeared to be quite pale; margination or cupping could not be determined.

Examination with the slitlamp showed in the right eye several small opaque deposits in the center of the cornea, a deep anterior chamber, and the presence of lenticular opacities.

In confirming the skin diagnosis Dr. Joseph W. Klauder stated that he had never before observed a similar case associated with glaucoma in 12 years at the Wills Hospital.

The X-ray report of Dr. Spackman disclosed an enlarged and slightly deformed right orbit. A peculiar formation of the right frontal sinus was also noted. He further observed that the general architecture of the skull appeared to show a tendency to congenital deformity. The sella turcica was unusually small and underdeveloped. The optic canals were slightly smaller than usual but equal and symmetrical on the two sides. The sinuses were all clear except the right maxillary, which showed increased density.

Dr. John Reese in a nose-and-throat study observed infected tonsils but no clinical evidence of sinus infection. He believed the nevus to be responsible for the cloudiness which existed in some of the cells of the sinuses on the right side. The nevoid process terminated about midway down the posterior pharyngeal wall.

Both Meinicke and Wassermann reactions were negative, and all blood chemistry findings were within a normal range.

Superficial punctate keratitis; its treatment with iodine solutions

Dr. Alfred Cowan and Dr. Thomas Cowan presented a paper concerning the use of iodine in the form of instillations of a 1-percent solution of potassium iodide and Pregl's solutions by pack in cases of superficial punctate keratitis.

Discussion. Dr. William Zentmayer said that for the conditions described by the Drs. Cowan he had been using iodine petrogin. This is a 6-percent solution of iodine and a liquid vaseline. In the previous week he had used it on a patient who had a herpetic eruption on the face, not zoster, with a denudation of the cornea of about 7 mm.; after treatment for two days it was reduced to about 2 mm. This

preparation is not at all painful to use and can be repeated daily. He does not believe there is any better treatment for scleritis than massage and this preparation of iodine petrogin.

Dr. George J. Dublin reported the case of a patient for whom he used the same treatment as that advocated by the Drs. Cowan. The patient had been under treatment for approximately 11 months for a herpetic ulcer, and did not respond to the usual method of treatment. Subconjunctival injections of pregl's solution were unsuccessful. In desperation he asked Dr. Alfred Cowan to see the patient, and he suggested trying potassium iodide by instillation and Pregl's solution by pack. The potassium iodide was used in 1-percent strength and was instilled in the cul-de-sac t.i.d. The pack of Pregl's solution was used every other day for six treatments. At no time did the cornea fail to show some staining areas prior to the new treatment. Following these six treatments with Pregl's solution and potassium iodide there were no staining areas for three successive visits, which covered a period of two weeks. The eye improved and the patient was discharged as cured. He attributed it to this form of treatment.

Papillitis secondary to iridocyclitis

Dr. Wilfred E. Fry said that his case report represented a type of change in the posterior segment of the globe associated with severe inflammation of the anterior segment. Such inflammation may be corneal ulceration, iritis, or iridocyclitis. The changes in the anterior segment do not necessarily have to be prolonged and in this case the inflammation was not of particularly long standing. The changes are entirely in and about the disc.

The patient was a 78-year-old woman who first complained of an inflamed right eye on April 11, 1935. Two days later, when she first consulted a physician, drops were given. Nine days later there was a large ulcerative area involving the lower, inner sector of the cornea. The patient was immediately hospitalized.

The general examination was negative except for hypertension (blood pressure 230/100) and urinary changes which consisted of a marked cloud of albumin and a few fine granular casts.

In spite of treatment consisting of subconjunctival Pregl's solution and milk intramuscularly as well as local applications, the condition became worse and the right eye was enucleated on the 29th of April. A section of the eye showed a dense corneal infiltration and an area of perforation which occurred at the time of operation, dense infiltration of the iris, inflammatory occlusion of the pupil, markedly dilated choroidal vessels, and a subretinal space into the papilla. The lamina-cribrosa fibers retained their normal contour. The retina, except close to the papilla, retained a relatively normal structure.

He believed this represents a papillitis, although other conditions must be considered: first, a choked disc from intracranial pressure; second, a choked disc associated with hypertensive retinitis; and third, edema of the papilla from ocular hypotony.

Reading difficulties in children

Dr. George E. Berner read a paper on this subject.

Discussion. Gladys G. Ide, Ph.G., said that Dr. Berner has presented the problem of children who have difficulty in reading, the cause of which probably is a defect in vision.

A certain group of children having eye defects and very good mentalities are able to make accommodation to visual defects even though these may be quite serious. They will also learn to read even under the most adverse circumstances.

Most children, however, are not mental-

ly good enough to be able to learn to read with a bad visual defect. The need for accommodation is not recognized and the child fails because he does not know how to make use of his poor visual equipment to the best advantage. Neither will he try, as she had seen one child try, to make accommodation when an appreciable amount of time was required to focus his hyperopic eyes on a stimulus. Few children can endure the strain or discover for themselves what must be done in order to secure a definite image. The plea which education makes to the ophthalmologists is on behalf of those children who must be accommodated to school requirements and who are unable to meet these requirements because of poor vision. About 10 percent of the ordinary dull children entering school are unable to profit by school instruction in reading because of poor vision.

The largest number of people in a given group come from the poorer mental sections of that group. It cannot be expected that those of poorer mentality will be able to do the work which individuals of good mentality can do.

A. G. Fewell,
Recorder.

COLORADO OPHTHALMOLOGICAL SOCIETY

October 16, 1937

DR. V. H. BROBECK, *president*

MALIGNANT MELANOMA OF THE CHOROID WITH RETINAL DETACHMENT

DR. V. H. BROBECK presented the case of F. L., aged 39 years, who had noticed that the vision of the left eye had been failing for three months. During this time an optometrist had given muscle exercises with no improvement. The vision was reduced to 0.1 with eccentric fixation. The entire lower half of the retina was detached. A sclerotomy was performed for diagnostic purposes. Following this the detachment disappeared except for a cone-shaped area at the equator, inferiorly. The eye was enucleated. Microscopic examination showed the presence of a malignant melanoma of the choroid, spindle cell subtype "B."

Discussion. Dr. B. Hopkins asked if the optic nerve should not be severed far back in such cases to prevent metastasis.

Dr. W. H. Crisp did not think that metastasis was more likely if the nerve was not cut far back. He also suggested that treatment by irradiation might offer some prospect of success.

INTRAOCULAR FOREIGN BODY

DR. V. H. BROBECK presented the case of T. M., aged 26 years, who was struck in the left eye by a piece of metal from a metallic bit. The metal entered the eye one millimeter below the lower limbus. The pupil was irregular and the anterior chamber was about one fourth filled by hyphema. The foreign particle was seen with the ophthalmoscope inferiorly and temporally at the macula. X-ray localization placed the position of the foreign body one millimeter outside of the globe. The ophthalmoscopic findings were relied upon, however, and a scleral incision 16 mm. from the limbus was made. A scissors blade was introduced into the incision and a magnet applied to the scissors. On withdrawal of the blade the metallic particle was removed. The vitreous shows numerous projections of proliferating exudate extending from the equator forward toward the lens. There is a large superior nasal scotoma. Vision is 0.1.

BILATERAL PERFORATING INJURIES FROM DYNAMITE EXPLOSION

DR. GEORGE STINE presented the case of O. B. M., who received perforating wounds of both eyes by rock particles following a dynamite explosion. Early

treatment consisted of tetanus and gas-gangrene antitoxin, foreign protein, hot packs, and atropine. A fulminating panophthalmitis developed in the right eye within 24 hours and the eye was later enucleated. The left eye showed many fine rock particles imbedded superficially in the cornea and bulbar conjunctiva and also some particles deep in the substantia propria. Apparently the sclera had been perforated temporally. Numerous corneal foreign bodies were removed at different sittings. All teeth were removed because of severe dental infection. At the present time the left eye is free from inflammation and the cornea is slowly clearing. The fundus details may be seen fairly distinctly. Present treatment consists of pilocarpine sweats and 4-percent quinine ointment. The vision is improving and is now 0.5.

Discussion. Dr. W. H. Crisp urged that patients who had lost one eye should wear spectacles, regardless of the presence or amount of refractive error in the remaining eye, as a matter of protection against injury to this eye. He also commented on the importance of the statement by Dr. Stine as to removal of the patient's teeth. It is always important to consider dental infection in an injury case which shows slow recovery from inflammation.

Dr. Crisp referred again to a case already reported in which an eye with innumerable rock particles in the cornea had shown remarkable gain in vision several years after a final award had been made for practically complete loss of industrial vision. This was in spite of the fact that the rock particles were still present in the cornea.

Tuberculous uveitis

Dr. George Stine presented the case of N. F. M., aged 45 years, who had been suffering from a painful, inflamed eye for 11 months. The eye had shown some circumcorneal hyperemia. The entire corneal surface was covered with "mutton fat" K.P. and there were cells in the aqueous. The pupil was moderately dilated and showed a few posterior synechiae. During the course of the disease there have been repeated attacks of secondary glaucoma with the tension as high as 65 mm. Hg. During the attacks repeated paracenteses have been made. The use of 1:1000 epinephrine did not lower the tension and produced a paradoxical effect by contracting the pupil. Between the glaucomatous attacks the tension has been around 30 mm. Two infected teeth were removed. General physical examination, including X-ray study of the lungs and Wassermann reaction, was negative. The patient was extremely sensitive to tuberculin. Treatment has consisted of gradually increasing doses of Bacillary Emulsion, given at seven-day intervals. The last dose was .01 mg. There have been no local, focal, or general reactions from the tuberculin. The patient has been unable to take a prolonged rest on account of financial conditions. In August, 1937, he did hard manual labor for 10 days. A week later the eye rapidly became very soft. The chamber became shallow, the pupil smaller, and the cornea clearer. Three nodules, probably tubercles, developed on the collarette. Since that time the eye has remained very soft, the anterior chamber shallow, and the iris bound down by synechiae. There is a yellow reflex from the vitreous, and the lens is hazy. The appearance is that of an early phthisis bulbi.

Discussion. Dr. Fritz Nelson stated that in Europe it is now quite general to treat cases of probable tuberculosis of the eye with very small doses of X ray (0.1 skin erythema dose) about three times in the course of two weeks to one month. The tuberculous uveitis is believed to be much more frequent in Europe than in the

United States. Less tuberculin is used today in Europe than was used 20 years ago. It is believed that 80 percent of all uveitis cases in Germany are tuberculous.

Dr. V. H. Brobeck said he has used, in several old cases of uveitis, the "H" antigen recommended by Dr. Albert H. Brown of Cincinnati and issued solely for private trial by one of the large drug firms. The initial dose of the preparation of typhoid bacilli is 25 million intravenously, and produces a less violent reaction than other types of typhoid antigen. The highest temperature that Dr. Brobeck has encountered is about 101 degrees.

Dr. E. W. Newman stated that a good deal of the antigen had been used in the clinic of the University of Iowa with gratifying results.

Dr. James Shields, commenting on the supposed significance of iris nodules in such a diagnosis, recalled a case of uveitis with unusually large nodules in which removal of a dead tooth had been followed by prompt recovery. Dr. Shields remarked that in his experience more cases of tonsillar involvement occurred when dealing with posterior-segment uveitis and more cases of dental disease when dealing with anterior-segment uveitis.

Dr. W. H. Crisp stated that the relative painlessness and the so-called mutton-fat deposits on Descemet's membrane were usually regarded as having special significance where tuberculosis was suspected.

John C. Long,
Secretary.

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

October 18, 1937
DR. ISAAC H. JONES, *president*

AN INTERPRETATIVE STUDY OF HETEROPHORIAS

DR. SAMUEL V. ABRAHAM first pointed out that the primitive position of the eyes is in divergence and that the eyes in humans have not yet completely evolved from that state. The orbits still diverge. The extraocular muscles perform their major function best and almost exclusively when the eyes are in the primitive divergent position.

He suggested, and data were presented supporting the suggestion, that the eyes would turn to the primitive position when the force of the fusion faculty is effectively removed. The degree to which this turning takes place will depend upon the effectiveness of the method used in disturbing the activity of the fusion faculty. The occlusion test as advocated by Marlow was here shown to be one of the steps demonstrating this tendency of the eyes. As a clinical test of practical importance the author felt that it had no essential value.

Dr. Abraham urged that the conception of heterophorias be changed; that heterophorias be considered part of the obtainable evidence concerning the activity of the fusion faculty to be used together with evidence obtainable by a study of the duction power. He urged that the general health, as a factor markedly involving the fusional activity, be given special attention.

Harold F. Whalman,
Editor.

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ANNALES D'OCULISTIQUE CENTENNIAL

Our French contemporary, The Annales d'Oculistique, is celebrating this year the one hundredth anniversary of its founding. This journal is thus the oldest existing publication of our specialty. Florent Cunier, a military surgeon of Bruxelles, published the first issue in January, 1838. At that time there was a well-recognized need for an ophthalmic journal in French. The practitioners acknowledged that ophthalmology was a neglected subject and that its practice in France and Belgium was inferior to that in Germany, England, and Italy. Previously the ophthalmic articles published in French had been scattered among numerous general medical periodicals. The Annales was founded with the purpose of collecting such ophthalmic articles into one journal, thereby stimulating interest and raising the prestige of Franco-Belgian ophthalmology. This purpose has been most generously fulfilled and this journal has had a great influence in shaping ophthalmic thought and practice during the century. Although Franco-Belgian in origin, the present-day contributions are from distinctly international sources, perhaps half of the articles coming from contributors other than French or Belgian. The table of contents of the first volume is reprinted in a commemorative issue, Annales d'Oculistique, January, 1938. In that first volume a number of articles were devoted to military or Egyptian ophthalmia (trachoma). Other articles dealt with the use of silver nitrate as a cautery and reported on animal experi-

mentation with eye diseases. In spite of the lack of knowledge of the ophthalmoscope, of bacteria, of anesthesia, or of refractive errors, the titles of the articles are not strikingly unlike those of a modern ophthalmic journal.

John C. Long.

CORNEAL LESIONS WITH GENERAL DISEASE

Corneal disease causes permanent damage by opacity. Filarial blinding was first described, with an account of its etiology, by Professor R. Pacheco Luna, of Gautemala, in this Journal in February, 1918 (p. 122). The particular form of Filaria causing the lesions was identified by T. M. Izquierdo, as the *Onchocerca volvulus* (American Journal of Ophthalmology, 1919, April, p. 274), and also by Dr. Henry Ward. This etiology has been confirmed by other observers. The disease has been called filarial blindness. It seems to originate only in the tropical regions of Africa and Central America. Few ophthalmologists have seen the Filaria, or the corneal lesions it causes. A case recently published (Lancet, March 5, 1938) seems to prove the possibility of such cases being discovered in widely separated parts of the world. It may also suggest a possible explanation of the obscure corneal conditions.

An Englishman, 26 years old, went to South Africa and Northern Rhodesia near the Belgian Congo, and lived there from 1929 to 1931. Then he went north to British East Africa. In 1934 he traveled through Egypt, Palestine, Turkey, and Germany to England. After treatment for malaria, appendicitis, and other conditions, he came, in December, 1936, to the Liverpool School of Tropical Medicine. There he was found to be suffering from filariasis. Under treatment his general condition and his vision rapidly improved. This case is reported by Dr. A. R. D. Adams, and the eye conditions were observed by Mr. McKie Reid of Liverpool.

In this case, as in those studied by Pacheco Luna, no Filariae were found in the cornea. They were found in the blood and in small tumors under the skin, particularly in the scalp. The young—the microfilariae—were found in the blood. But none were found in the cornea. The corneal lesions were small areas of opacity, those in front of the pupils impairing vision. Under mild local treatment, the vision improved with the general treatment of the filariasis.

The most effective remedy to limit the corneal lesions is the removal of all the tumors, especially those in the scalp. In these the adult worms, often 30 to 50 centimeters in length, are found. The specific form of the Filaria is named the *Onchocerca volvulus*. The patient was in the hospital six weeks, and 10 months later was "in robust health," with improved visual acuity.

This case illustrates how obscure and and elusive may be the etiology of corneal lesions. For various other corneal conditions the etiology is not certainly known. Among these are acne rosacea, bullous, dendritic, epithelial, herpetic, malarial, phlyctenular, and trophic keratitis, deep marginal ulcer, keratomalacia, and the opacities attending and following such lesions. With filarial, blinding keratomalacia, malarial keratitis, and phlyctenular ophthalmia the connection of the corneal lesions with disease in other parts of the body is well established. What is the basis of this liability of the cornea to such damage? The cornea is peculiar in that it is transparent. Its normal nutrition preserves its transparency, and its nutritive processes are guarded by two glass membranes, Bowman's membrane and the membrane of Descemet. Any considerable

break in these membranes causes opacity; and from a permanent break the opacity is permanent. Some influence from colonies of Filaria in the body must cause corneal opacities, probably through some material circulating in the blood and lymph, which these protective membranes are not able to exclude.

It is known that in the normal aqueous humor, antibodies are always deficient. But when the cornea is incised and the aqueous escapes and is rapidly replaced, this temporary aqueous contains a larger proportion of antibodies, more like that in the blood plasma. This increase of antibodies is a condition favoring healing, brought about by the various forms of incision practiced to check the progress of corneal infections, the Saemisch incision, and the delineating keratotomy of Gifford. The transparency of the other refracting media of the eye is protected also by Bruch's membrane, the retinal pigment epithelial layer, and the capsule of the crystalline lens. The protective mechanism that preserves the transparency of the refractive media of the eye is probably not able to cope with conditions produced by pathologic changes set up in the blood by the invasion of filarial parasites, or by other diseases known as liable to cause corneal opacities. The lens and the vitreous are also exposed to similar dangers. Filarial blinding should be looked for and studied from this point of view; and this case shows that, although very uncommon outside the tropics, a case might be encountered in any large medical center of the world.

Edward Jackson.

GLAUCOMA WITHOUT HYPERTENSION

It is probable that before the invention of the tonometer some cases of simple glaucoma were diagnosed as cases of primary optic atrophy. The mistake is indeed still possible, although less likely to occur, thanks not merely to the tonometer but to refinements in perimetry or scotometry.

The degenerative character of glaucoma is probably responsible for the great variety of its manifestations—the fact that in no two patients, not even in the two eyes of the same patient, is the clinical picture identical. Fields, tension, atrophic changes, have a different grouping in every patient.

In 1857 Graefe published in his personal journal, Archiv für Ophthalmologie, an article in which he considered "amaurosis with excavation" as an independent affection not to be regarded as a form of glaucoma. But by 1862 he had changed his mind concerning this question, on the basis of Donders' argument that in these cases the variations in tension might be feeble and transitory.

In 1882, again before the tonometric era, Mauthner contended that increase in intraocular tension was not an indispensable symptom of glaucoma; and this opinion was later approved by Schmidt-Rimpler and others. But at a later date, Morax, in his monograph on "Glaucoma and glaucomatous patients," vigorously denied the existence of glaucoma without rise of tension.

Magitot (Annales d'Oculistique, 1938, v. 175, p. 349) sets up three groups of patients in whom glaucoma, characterized by other symptoms such especially as loss of visual acuity and changes in visual field, is more or less definitely recognizable in spite of the absence of appreciable increase of intraocular tension.

The first of these groups includes certain forms of glaucoma developing in myopic eyes. Axenfeld and his pupils considered Schnabel's cavernous atrophy as belonging to such a group. These cases show (1) a tension not ordinarily con-

sidered as transcending normal limits in emmetropic or hyperopic eyes, (2) a fall in tension under the influence of pilocarpine, and (3) campimetric defects.

In Magitot's second group he would include all cases of chronic glaucoma with low tension yet showing from time to time slight but characteristic ophthalmotonic augmentation. He reviews a series of such cases from the literature. Some of the patients were occasionally troubled by seeing colored haloes around lights, and on such occasions there might be a fugitive rise of tension in one eye as compared with the other, or the fields showed arcuate (Bjerrum) scotomas. Or provocative tests (caffeine, hydremia, darkness, stooping position of the body, or squeezing together of the eyelids) caused hypertension.

In one of the two personal cases of this sort reported by Magitot, the tension, generally described as within "normal" limits, never exceeded 32 mm. (Schiötz). In the second personal case, the right eye had been operated upon for acute glaucoma. The left eye showed irritative symptoms (haloes, corneal edema, mydriasis) with lowering of visual acuity, although the tension of this eye was never higher than 30 mm. (Schiötz) except under provocative tests.

Magitot's third group consists of those cases in which the only common signs are cupping of the disc and campimetric defects. In Magitot's experience the patients belonging to this group have always presented definite indications of vascular sclerosis, whereas of glaucomatous subjects in general 60 percent have vascular sclerosis.

One personal case of this strictly nonhypertensive type is cited by Magitot. An interrupted record extending over more than two years showed the intraocular tension usually below 18 mm. and only once rising above 20 mm. The upper halves of the fields were almost entirely lost and the lower halves were greatly contracted. During the period of observation the central visual acuity actually fell from one third and one half respectively to 0.2 for the right and 0.3 for the left eye. The discs showed four diopters of cupping. Neurologic, intranasal, and X-ray examinations were negative except that the sphenoidal bone showed decalcification.

The patient, a woman aged 68 years, had an aneurysm of the carotid and a "senile aorta," and hence was suspected of having an angiosclerosis involving the chiasm and the intracranial optic nerves. The possibility of a meningioma of the sphenoid was opposed by absence of headache and anosmia and of the Foster-Kennedy syndrome.

In such a case, the problem of diagnosis is complicated by the fact that glaucoma may show an infinite variety of visual-field defects. Thus, one patient or one eye may have reduction in central visual acuity with very little peripheral disturbance, another may show a sector defect reaching almost to the fixation point in spite of excellent central acuity, another may have good central vision with small islands of blindness scattered throughout the visual fields, and a fourth may read with relative ease and yet have to grope his way about because of a "telescopic" field.

Serious doubt may be thrown on the usual statement that intraocular tension corresponding to readings of between 12 and 28 mm. by the Schiötz tonometer is within normal limits. It is remarkable how uniformly a patient whose eyes are normal beyond question shows a tension of 18 mm. provided the patient has been carefully trained in the technique of the test.

The present commentator always feels some anxiety as to the future of an eye

which shows a persistent record of intraocular tension above 20 mm., especially in the presence of inequality between the two eyes. He is disposed to condemn the habit of regarding as entirely satisfactory a permanent Schiötz reading of 26 or 28 mm. after iridectomy or a fistulizing operation. Sooner or later such eyes will almost invariably undergo progressive deterioration.

From this point of view the title of Magitot's essay may be considered a misnomer as regards nearly all of the cases which he cites, since the intraocular tension, although within so-called "normal" limits, was usually greater than 20 mm.

Furthermore, serious consideration may be given to the possibility that some eyes whose tension never exceeds 18 mm. are really glaucomatous. Just as some optic nerves and retinas seem able for long periods of time to tolerate pressures greatly above normal, so, for unknown reasons, other optic nerves and retinas may be unable to withstand what we regard as mean or absolute normal tension. Obviously, in such eyes the tissues are not normal, but we can hardly think of glaucoma without presupposing a degenerative tendency.

The present writer has had under observation for several years a patient who long ago completely lost the sight of one eye from what appears to have been a glaucoma of more or less congestive type. This patient's other eye is typically glaucomatous as judged by the presence of pupillary dilatation, loss of the peripheral field, and atrophy with deep cupping of the disc, as well as by a chronic history furnished by the patient and his earlier oculists and extending back for 20 years. The central acuity of the left eye is almost one half of normal, although the field is limited to a central area extending only 3 to 8 degrees from the fixation point. The tension of this eye without a miotic is from 20 to 23 mm. Schiötz, and under a few doses of a 1-percent solution of pilocarpine fell to 10 mm. or less (so that a 0.2-percent solution was ordered for general use).

Taking tension with the fingers is altogether inadequate in the diagnosis of early stages of simple glaucoma. In using the tonometer, a suspicion of glaucoma should never be dismissed because the reading is only a few points above the mean normal (18 mm. Schiötz).

W. H. Crisp.

ANGIOSCOTOMETRY

Elsewhere in this issue is reviewed "An introduction to clinical scotometry." The essential feature is angioscotometry, not, as its name would seem to indicate, measurement of the scotomata caused by blood vesesls, which would be of limited academic value, but, in truth, a phenomenon of much more complicated nature, seemingly dependent on many clinical factors.

It has been found that these scotomata vary remarkably in diameter with great rapidity. Sudden increases to as much as five or six times are not rare. The explanation of the exact cause is not entirely clear but apparently it has to do with the width of the lymphatic bed; certainly it is not dependent on the vessel's size, for the diameter increases at times when the vessel caliber itself is known to decrease.

Of more importance than the theory underlying the phenomenon is the clinical application. It is indeed most interesting to learn that this seems to be an extremely delicate indicator of pressure changes within the eye; for example, that in glaucoma it is far more sensitive in gauging the "coffee test" than is the relatively crude tonometry. It may possibly have value as a clue to ocular changes due

to sinusitis, and one worker has contended that it is of value in differentiating true from pseudoneuritis.

Whether all of the early findings will eventually prove correct remains to be seen, although it is now nine years since the first exact work was reported, and much of the study has been confirmed. Other data will certainly be added, and the whole better evaluated when more ophthalmologists have investigated the subject. The author states that the clinical application is relatively simple. Perhaps this is one more test that we should all be prepared to make in our offices.

The number of special tests now possible as aids to diagnosis is becoming almost prohibitive, to which must be added numerous complicated therapeutic measures. Elaborate tests for muscle power, amplitude of fusion, phoria training, nasal cultures with autogenous vaccines in cases of focal infection, biomicroscopy, fever therapy, aniseikonia, exact perimetry, and now angioscotometry, all require elaborate equipment and are vastly time consuming. It seems almost impossible for one ophthalmologist working alone to handle them. The very factor of expense will overwhelm him. Technicians are almost necessary, and the individual patient can seldom afford to pay adequately for these special services. In the large cities it may be possible for the ophthalmologists to establish and support technical units where any or all of these tests may be made and, when necessary, training given. Surely only a very exceptional office could be equipped to take care of all these ophthalmological possibilities. One office is known that does attempt to do this, and the personnel in addition to the office chief includes three assistant ophthalmologists, three technicians, two trained nurses, and four secretaries!

Returning to scotometry, it is a relatively new field and is deserving of careful consideration. It is hoped that some of the important workers in this field will give instruction courses in the subject so that its clinical application may be available to all.

Lawrence T. Post.

BOOK NOTICES

TRANSACTIONS OF THE SECTION ON OPHTHALMOLOGY OF THE AMERICAN MEDICAL ASSOCIATION, 1937. Clothbound, 324 pages, 54 illustrations. American Medical Association, 1938.

Most of the 19 papers that make up the bulk of these Transactions have been published; either in the Journal of the A.M.A., or in special journals. But here we have the discussions they brought out, which may be as valuable as the paper discussed. And to have them all arranged and indexed, in this convenient volume, is a great help to those who wish to read and refer to them in their preparation for the practice of ophthalmology. To all such this volume is worth its low price.

In addition to the papers and discussions, the committee reports and lists of members of the Section are always worth having. In this volume tobacco-alcohol amblyopia, optic neuritis, the prevention of blindness, the reactions of the pupil, and ptosis are given the attention that is deserved on account of their practical importance.

Edward Jackson.

OFTALMOLOGIA DEI PAESI CALDI. By Vitorio Ruata. 362 pages, 92 illustrations with 4 plates in color. Milano, Ulrico Hoepli, 1938. Price, $2.70.

This volume deals with the ophthalmology of tropical countries. Including nine chapters, the first is devoted to cli-

matic, atmospheric, and social conditions, together with the customs that may serve as a background for the manifestations described subsequently in the book. The second chapter is given over to the affections arising through the intermediary of animal sources, either by mechanical or chemical irritation, due to transfer of pollens by insects, for example, or by depositing their own hairs on the conjunctiva. The lesions they cause may become secondarily infected. Other lesions are described, the result of certain termites and also the venom of different snakes, particularly the species Sputatrix. In the third chapter, the conditions due to various tropical parasites are given, with a life history of the more common varieties encountered. This forms a particularly interesting chapter, coming somewhat as a revelation to one seeing the ophthalmology of more temperate countries. The fourth chapter contains a discussion of the bacteria more generally associated with ocular infections, and contains the usual information on this subject. The different conjunctivitides, infections, follicular, phlyctenular, and so forth, are then described and methods of treatment are discussed. A review of trachoma is given in the next chapter, and as previous publications of the author on this subject would suggest, it is briefly and competently handled. The next chapter, entitled "Diseases of the cornea," branches out to cover practically the entire orbit. The eighth chapter, on generalized diseases with ocular manifestations, is the longest in the book (100-odd pages) and covers such conditions as leprosy, avitaminosis (mostly vitamin A), beri-beri, pellagra, leishmaniasis, spirochetoses, malaria with related quinine intoxication; anchilostomiasis, dysentery, plague, smallpox, and dengue fever. This forms in all an interesting mass of information. A final chapter is reserved for surgical measures and precautions to be practiced in tropical countries.

In a general way, the book runs along smoothly with brief descriptions, is amply illustrated with cuts and plates, and should be of service to one practicing tropical ophthalmology. The bibliographical references, on the other hand, are incomplete both in numbers and in citations.

L. A. Julianelle.

TEXTBOOK OF OPHTHALMOLOGY. By W. Stewart Duke-Elder, M.D., F.R.C.S., Surgeon Oculist to H. M. the King. Volume II, cloth-bound, pages 1125 to 2095; 742 illustrations including 24 colored plates. St. Louis, Mo., C. V. Mosby Company, 1938. Price $15.00.

The second volume of this encyclopedic textbook shows the continued growth of ophthalmology since the publication of volume I in 1932. This volume gives the clinical methods of examination, congenital and developmental anomalies, pathological and therapeutic considerations, and diseases of the outer eye.

Section IX, chapter XXVIII, concerns the objective examination of the eye which includes the technique of biomicroscopy and its clinical applications. The use of polarized light, spectro-analysis, and the photography of the anterior segment are discussed in detail. The use of restricted spectral light in ophthalmoscopy and the aids in localization in the fundus are especially valuable. Chapter XXIX is devoted to the subjective examination of the eye. Direct vision, accommodation, the light sense, color vision, the visual fields, and entoptic phenomena are presented. In Section X the congenital and developmental anomalies of the eye are reviewed. This section of 177 pages

is a comprehensive text on the influences regulating the anomalies in development and the clinical appearance of the defects. There are excellent illustrations including the anomalies of the interior of the eye. The congenital lenticular changes are well shown. The general pathological and therapeutic considerations of the diseased eye are taken up in Section XI under five categories, metabolic disturbances, circulatory changes, degenerations, disturbances of growth, and inflammations. Section XII is devoted to diseases of the conjunctiva, cornea, and sclera. There are 311 pages dealing with conjunctival afflictions. The diseases of the cornea are described in detail and the illustrations are clearly and accurately reproduced. There are 233 pages of excellent material. The final chapter covers the diseases of the sclera.

This volume will be an integral part of the clinical ophthalmologist's library. The tremendous amount of material presented, the clarity of the text, and the comprehensiveness of the bibliography and index make this work monumental in its field. The early appearance of volumes III and IV is desired.

William M. James.

A TEXTBOOK OF EYE, EAR, NOSE AND THROAT NURSING. By Abby-Helen Denison, R.N., completely revised by Lyyli Eklund, R.N. 368 pages. The Macmillan Company, 1937.

The book has been prepared for the instruction of nurses. The simplicity of the presentation of the anatomy, physiology, and pathology of the eye, ear, nose, and throat makes it valuable as an outline for teaching. The technique of nursing procedure in relation to diseases of the eye, ear, nose, and throat is clearly outlined and freely illustrated. This work will be of particular value to anyone engaged in teaching nurses or undergraduate medical students.

William M. James.

STRUCTURAL VARIATIONS OF THE HUMAN IRIS AND THEIR HEREDITY. By Viggo Eskelund. Paper covered, 242 pages, illustrated with 54 plates of photographs in monochrome. London, H. K. Lewis & Co., Ltd., 1938.

The observations reported in the present work were carried out in the Anatomico-Pathological Institute of the University of Copenhagen. The first problem consisted of examinations of the normal limits of the iris variations and their relative frequency and combinations. The next problem was the investigation of the existence of these variations where related persons were concerned, and this especially with a veiw to the possible advantageous application of iris examinations in cases of alleged paternity. Variations in the appearance of the iris show in its "frontal boundary" or anterior border layer. Greatly enlarged photographs were used as the basis of an all-round estimation of the structural variations of the iris. In this photography, a Zeiss-Tessar 4.5 with a focal length of 15 cm. was fitted onto a Graflex camera. Very fine-grained silver-eosine plates were used allowing enlargements of 15 times. For lighting the iris, a small flash-light was used, with a tin-foil reflector placed about 0.75 meter from the eye. The duration of the flash was about 1/50 sec., which is too brief an interval for the contraction of the pupil to show in the photograph. The principal factors of variation in these observations on the iris were the number of concentric contraction furrows, the degree of transparency or opacity in the pupillary or central zone and that in the ciliary or peripheral zone, the relation of

the size of the area of the central zone to that of the entire iris, and lastly the degree of diffuse atrophy affecting the entire anterior-border layer. The investigation originally included 154 persons, but as it was found that different degrees of a variation were remarkably frequent in members of the same family, the examiner excluded all related persons, thus reducing the number to 93 (49 men, 44 women). Usually only the left eye was used in each individual.

No pigmentation of the iris was found in over one fourth of the cases. Examination for the color of the iris was made with the aid of a loupe of 6 magnifications. Attention was paid to the basic color and to the presence of shades of other colors. Since the mesodermal pigment was always strongest near the center and decreased outwards, in classification, it was necessary to divide the iris into 3 zones: a central (corresponding to the pupillary zone), an intermediary (about two fifths of the ciliary zone), and a peripheral zone. By notation of the iris-color according to this plan, the author proposes 5 types instead of the division into 7 types used by criminologists. An inverse proportion seemed to exist between the intensity of the pigmentation and the diffuse atrophy.

In an investigation of 14 married couples with 44 children and 14 children of whom only one parent was examined, the degree of opacity of the anterior-border layer of the children showed a resemblance with that of one of the parents. The number of contraction furrows and the central and diffuse atrophy were all found to be inherited with slight variations.

A chapter on the width of the cornea, its form and area, and another on the inheritance of corneal variations are included in the book.

The entire work is worthy of careful consideration both because of its great accuracy of detail and because of its importance to ophthalmology and medical jurisprudence. It should be the inspiration for the carrying out of similar investigations in other parts of the world.

Harvey D. Lamb.

CLINICAL SCOTOMETRY. By John N. Evans, M.D., F.A.C.S. Published for Long Island College of Medicine by Yale University Press, 1938. Clothbound, 266 pages, 57 illustrations; appendices, bibliography, index. Price $4.00.

In the preface the author states that he has discussed old procedures and reviewed ". . . certain heretofore unknown phenomena, physiologic and pathologic in nature . . ." and "outlined an hypothesis for interpretation of defects which has its foundation in a great mass of evidence gathered by many workers and thoroughly corroborated during the last decade."

In previous writings the author coined the word "angioscotometry" from "angio" (vessel), and "scotoma" (darkness) to indicate a "Scotoma which the retinal vessels seem to project." He regrets that readers fall into the—to the reviewer, natural—mistake of assuming that this meant a shadow cast by a blood vessel, in spite of his repeated assertion that this was not so.

Following the introductory chapter is one on the history of the subject. Then there are rather involved chapters on Equipment, Fixation conditions, The object—theoretic conceptions, and Technique.

In chapter seven the reader begins to get a clue to the nature of angioscotometry and its implications. Herein it is stated that the "widening phenomenon" and certain other characteristics of the scotomata made untenable the hypothesis

that the plotted defects were actually and purely the projection of shadows in the ordinary sense of the word. There follows a minute description of the morphologic characteristics of these angioscotomata, and the widening phenomenon. This consists in sudden variations in width of the vessel shadows, occasionally to as much as five or six times the original diameter.

Not only the rapidity and extent of the changes precluded the possibility of the scotomata being merely a change in vessel size but also such facts as that compression of the globe, which reduces vessel size, actually increases the angioscotoma. Other factors producing increase are: suspended expiration; inversion of posture; cervical compression; psychologic disturbances; stimulation by light; menstruation; nasal-cavity manipulation; cervicol-sympathetic stimulation.

Thereafter follow chapters on the Scotometry of retinal edema, Sinus disease with illustrative case histories, Transient fluctuations in the scotoma of glaucoma.

The theoretical consideration of the origin of scotomas is the next subject. Apparently the perivascular lymph space is the important factor in the fluctuations of the angioscotomata. Further consideration is given in chapters on Hypothesis of angioscotometry and The relation of the fiber-bundle hypothesis to angioscotometry.

Much space is given to appendices. The final paragraph on Conclusions is worth quoting:

"Accepting the data accumulated under the conditions of these experiments, and with due consideration of all the factors set down in previous communications on the subject of angioscotometry, it would seem reasonable to assume that the angioscotoma may arise through insufficient oxygen reaching the retina in those regions corresponding to the defect. One of us has devised an hypothesis to explain these defects on the basis of dysfunction of the synapses in the retina due to oxygen deprivation. It seems reasonable to accept the findings of the present investigation as adding support to this hypothesis."

It is of great value to have this subject presented so completely as it is in this book. Much of it isn't easy reading but the concept is difficult. The author states that the clinical application is not difficult. It would seem that careful instruction in technique would, however, be necessary. This subject may prove of great importance and it behooves ophthalmologists to be familiar with it. A study of it is recommended.

Lawrence T. Post.

NOTE

Through an oversight, a note was omitted from Dr. Shapira's paper (July, 1938 issue, page 783) giving credit to Dr. Robert von der Heydt for the Kodachrome fundus pictures.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Ballantyne, A. J. **Modern methods in ophthalmoscopy.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 273.

The author points out the advantages of the narrow focused beam in study of the fundus, of red-free light, of yellow-green light, and of the sodium light. He regards the sodium light as the most useful of all auxiliary lights in general ophthalmoscopic work. It is obtainable in the form of a sodium-vapor lamp easily adapted to fundus examination.

Beulah Cushman.

Ballantyne, A. J. **The use of sodium and mercury-vapor lamps in ophthalmoscopy.** Brit. Jour. Ophth., 1938, v. 22, April, pp. 204-209.

The lamp unit used to obtain these lights is described. The advantage of the mercury-vapor lamp is that its light is composed primarily of short waves. The advantage of the sodium-vapor light is that it is almost purely monochromatic. Using these lights, finer details of retinal structure, particularly in its vascular system, can be seen. Pathological conditions can be picked up at an earlier period than with the ordinary mixed light. Such methods are counterindicated where appreciation of color values is essential, as in pigmentary changes. (Figures, references.)

D. F. Harbridge.

Berens, Conrad. **Kindergarten visual-acuity chart.** Amer. Jour. Ophth., 1938, v. 21, June, p. 667; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 351.

Boushmich, D. G. **A tangent localizer.** Viestnik Opht., 1937, v. 11, pt. 5, p. 659.

A description of a device for localization of diseased foci in the fundus, with tables for conversion of linear measurements into perimetric degrees. (Illustrations.) Ray K. Daily.

Dashevskii, A. I. **A new apparatus for examination of dark adaptation and the detection of malingering of hemeralopia.** Viestnik Opht., 1937, v. 11, pt. 5, p. 651.

A description of a device which, the author claims, eliminates the defects of the Nagel adaptometer and affords a rapid graph of dark adaptation. For the

detection of malingerers in dark adaptation he exposes a brightly illuminated cross, which the patient recognizes. The exposure is repeated at regular intervals, and the illumination reduced according to normal adaptation. As the cross thus appears every time equally bright to the normal test person, the malingerer recognizes it, and the malingering is detected. (Illustrations.) Ray K. Daily.

Dashevskii, A. I., and Boushmich, D. G. **The significance of angle kappa and its measurement.** Viestnik Opht., 1938, v. 11, pt. 5, p. 664.

The author demonstrates that determination of the angle kappa by localizing a light reflex on the center of the cornea is inaccurate. He proposes a method which consists of double localization of a light reflex at opposite ends of the limbus, and computation of the angle kappa from the data thus obtained. Ray K. Daily.

Fazakas, Alexander. **The role of mold fungi in ocular infection.** Klin. M. f. Augenh., 1938, v. 100, March, p. 434. **The significance of fungi for ophthalmology.** Zeit. f. Augenh., 1938, v. 94, March, p. 253.

Mold fungi occur in about one fourth of all normal eyes. The author was able to cultivate eighteen species of mold from 456 normal eyes. Of morbid eyes, 37 percent were contaminated by molds, showing that in illness the conjunctiva, lid margin, and lacrimal canals offer a suitable substratum for the growth of molds. Often the character of a lesion is modified by the presence of molds, so that diagnosis becomes difficult if the lesion has not been observed throughout its course. The author describes examples of such modifications in trachoma, eczematous pannus, dendritic keratitis, and chronic conjunctivitis. Keratomycosis periconica is a corneal inflammation caused specifically by periconia keratitidis, and the diagnosis is made by culture of the mold. F. Herbert Haessler.

Goldfeder, A. E., Marcus, I. M., Volinskaja, M. M., and Yoodkevich, D. B. **The melanoflocculation reaction in ocular disease.** Viestnik Opht., 1937, v. 11, pt. 4, p. 533.

A study of this reaction in 194 cases of ocular disease. The tabulated reports lead to the conclusion that this reaction, pathognomonic for malaria, is positive in the majority of cases of ocular involvement due to malaria. The reaction is positive most frequently in corneal disease, and less frequently in involvement of the choroid and retina. Ray K. Daily.

Hartshorne, Isaac. **A simplified, portable gonioscopic unit.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 544-546.

Kalkutina, M. L. **The physiologic dimensions of the blind spot and of angioscotoma.** Viestnik Opht., 1937, v. 11, pt. 5, p. 670.

The author examined one hundred persons by the method of Dashevskii. The white test object enclosed in a black frame may be varied in size, and the test consists in finding the size at which it disappears completely from view. A slight enlargement then appears to the test person as two white spots at opposite limits of the blind spot. The sizes of angioscotomas are determined in the same way and are taken with white and gray test-objects. The results are designated as the angioscotoma index, expressed in a fraction with the size of the scotoma for white as numerator, and that for gray as denominator. Under physiologic conditions the difference in the measure-

ments for gray and white is one third. Under pathologic conditions, the scotoma for gray enlarges and the difference becomes greater. Ray K. Daily.

Karelus, Kazimierz, **Fetal ocular pathology.** Klinika Oczna, 1937, v. 15, pt. 5, p. 532.

A detailed textbook description of the pathology of intrauterine ocular diseases and of the diseases of the newborn incident to normal or complicated delivery. Ray K. Daily.

Keller, W. **The scrofula problem.** Klin. f. Augenh., 1938, v. 100, Feb., p. 161.

The essay was part of a postgraduate course. The author emphasizes that one cannot use phlyctenulosis and scrofulous keratoconjunctivitis as equivalent terms. Such usage is etymologically ridiculous and implies inadequate comprehension of the nature of the disease. A child is scrofulous when it has an exudative diathesis and a tuberculous infection. Allergic reactions of the skin and conjunctiva as well as eczematoid conditions occur commonly in scrofulous children. Phlyctenular disease, however, is an expression of an allergic reaction and it happens that tuberculin is one of the commoner allergens.

F. Herbert Haessler.

Kleefeld, G. **New apparatus permitting extension of the exploratory field of Zamenhof's focalizer.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 12.

The author describes the improved apparatus in detail, and states that his modifications of the original instrument aim to make possible study of the upper and the lower portions of the vitreous, concerning the attachments of this region to adjacent membranes.

J. B. Thomas.

Kokott, W. **Stereoscopic photokeratoscopy.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 191.

The author produced entirely satisfactory photokeratograms with equipment which he improvised as follows: On a large piece of cardboard he drew 1-cm. concentric black rings to resemble a Placido disc. This was placed in front of a Zeiss stereocamera with an opening for the camera lenses. The Placido disc was brightly illuminated by two lamps behind the patient's head, one on each side. F. Herbert Haessler.

Lundberg, Åke. **A new ocular for fixation in the taking of visual fields in cases with unilateral central scotoma.** Acta Ophth., 1938, v. 16, pt. 1, p. 116.

The author describes an ocular containing a mirror which permits fixation of a laterally situated object with the good eye. (Illustrations.)

Ray K. Daily.

Marcus, I. M. **The significance of hematologic data in the diagnosis of ocular disease.** Viestnik Opht., 1937, v. 11, pt. 5, p. 646.

The author shows that hematologic studies are valuable in establishing the tuberculous, malarial, and syphilitic etiology of ocular disease. The red and white cell-counts differentiate tuberculous from malarial and syphilitic disease. Tuberculous diseases are characterized by normal polychromasia, normal thrombocyte count, normal or decreased reticulocytes, normal or increased leucocytes, normal or increased monocytes, and increased eosinophiles. In malarial and syphilitic diseases the blood picture is that of pathologic polychromasia, moderate thrombopenia, leucopenia, and a shift to the right. The monocytes and eosinophiles differentiate malaria from syphilis. In malaria

there is a monocytosis, and in syphilis monopenia eosinophilia may be present in both diseases, but is more frequent in syphilis. Ray K. Daily.

Vos, T. A. **Ophthalmoscopy in red-free light.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 195.

The author is impressed by the fact that red-free ophthalmoscopy is almost routine in the Vogt clinic and is used by everyone there. The apparatus originally described by Vogt is still the only adequate one. It is advisable to use an arc lamp with large carbons, as at best the area of the fundus illuminated is small. With substitute means, such as the mercury arc, the yellow color of the fovea and its derangements are not clearly seen. The mercury arc is not sufficiently intense and causes fluorescence of the lens. To show the range of usefulness of the method, the author briefly describes the fundi of 21 patients.

In toxic amblyopia, one is no longer dependent upon subjective manifestations. The papillomacular bundle is always involved, and this fact allows one to exclude disease of the macula. In optic atrophy, one sees extensive areas in which the nerve-fiber striation has disappeared. Temporal pallor is always associated with a corresponding indistinctness of striation of the papillomacular bundle. It is interesting to note that a cystoid degeneration of the macula explains the disproportionate reduction of visual acuity in some uveal inflammations. In closure of the central retinal vein there usually is cystoid degeneration of the macula, and often its development from very small cysts at the edge of the macula can be followed. The diagnosis of absent fovea can be made only with red-free light.

F. Herbert Haessler.

Wroblewski, W. **The bacteriologic and serologic diagnosis of tuberculous diseases and their treatment.** Klinika Oczna, 1938, v. 16, pt. 2, p. 151.

In tuberculous eye diseases the author emphasizes the importance of blood cultures for tubercle bacilli. Of 287 patients with tuberculosis he succeeded in demonstrating the tubercle bacilli in the blood in 205.

Ray K. Daily.

Zachert, M. **The use of the ophthalmoscope for examination of the limbus and diagnosis of trachoma.** Klinika Oczna, 1937, v. 15, pt. 5, p. 617.

The author believes that a 20- to 40-D. lens in the ophthalmoscope affords magnification equal to that obtained with the slitlamp, and sufficient for demonstration of beginning pannus and trachoma. Ray K. Daily.

2

THERAPEUTICS AND OPERATIONS

Arkin, Wiktor. **A new model for an operating lamp.** Klinika Oczna, 1937, v. 15, pt. 6, p. 721.

The author describes an inexpensive revolving lamp, with a high-voltage globe, which permits of direct connection with the electric current without use of a rheostat. (Illustrations.)

Ray K. Daily.

Borje, U., and Wolff, Herbert. **On the occurrence of acetylcholine esterase in the aqueous humor and the vitreous body.** Acta Ophth., 1938, v. 16, pt. 1, p. 157.

The tabulated findings of this study show that acetylcholine esterase can not be detected in normal bovine aqueous humor. The bovine vitreous body contains a considerable quantity of acetylcholine esterase; its activity in

the vitreous corresponds to about one eighth of the activity in the blood of man or horse. These findings are contrary to those of Velhagen and of Plattner and Hintner. The author attributes the authors' results to technical errors, particularly too complete emptying of the anterior chamber, which brings an increased inflow into it from the surrounding tissue, and hence penetration of the enzyme from the vitreous into the aqueous. Ray K. Daily.

Braunstein, H. E. **Phototherapy in ophthalmology.** Viestnik Opht., 1937, v. 11, pt. 4, p. 507.

A discussion of the effect of ultraviolet rays on the ocular structures.

Ray K. Daily.

Cavallacci, G. **Histo-chemical researches on the diffusion of gold salts in the adnexa and in the ocular globe introduced in various ways.** Arch. di Ottal., 1938, v. 45, Jan.-Feb., p. 11.

The author determined that intravenous, intramuscular, and subconjunctival injections of compounds containing gold, and also gold compounds instilled into the conjunctival sac, appeared in the adnexa and eyeball. After intramuscular and intravenous injections he found that gold appeared in marked quantities in the lacrimal glands, in the lids, in the conjunctiva, in the sclera, in the sclerocorneal trabeculum, throughout the uveal tract, and in the optic nerve. After instillation into the conjunctival sac and subconjunctival injection, gold appeared in the bulbar conjunctiva, the episclera, the sclera, and the cornea, and (in small quantities) in the iris and ciliary body. The author deduces that the beneficial action of gold therapy in diseases of the eye is due to activation of the reticuloendothelial system. He believes the method of choice in administration of gold is either intramuscularly or intravenously, because experiments show that by these methods the gold granules appear in larger quantities in the adnexa and in the structures of the globe, and also the gold granules appear in every other organ of the body in which there is a defensive reaction. Suspensions of gold in oil were found to be more effective than gold solutions prepared in other ways. (4 photomicrographs, 2 color plates.)

H. D. Scarney.

Frey, W. G. **The role of transfusion in ophthalmology.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 491-502.

Gala, A. **Hexargan, a new silver nitrate ointment; its use in treatment of conjunctivitis.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 234-237.

The author introduces a new ointment, "Hexargan," containing 1.3 percent $AgNO_3$ in ionized form—like the stick—combined with hexamethylentetramin in a eucerine base. It is a white ointment, producing no discoloration. It does not soil, and is easily endured as it has no unpleasant subjective effect. The bactericidal effect is much greater than that of solutions of silver nitrate in corresponding strength. It has been found useful in acute and chronic conjunctivitis; infections of lids and cornea; atonic abscesses and suppurating eczemas; and infected wounds which do not heal readily. Like other forms of silver nitrate, it should not be used in conjunction with scopalamine, homatropine, pilocarpine, cocaine, or holocaine, because these substances reduce the silver and so weaken the effect of the compound.

Georgiana D. Theobald.

Kurz, Jaromir. **Optocaine.** Ceskoslovenska Ofth., 1937, v. 3, no. 3. pp. 238-242.

Optocaine contains equal parts of 2 percent percaine and novocaine, with rivanol, a powerful antiseptic. It may be used for infiltrative and nerve-block anesthesia. Georgiana D. Theobald.

Langhammerova, R. **Experience with gold therapy.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 242-251.

Fourteen cases of chronic tuberculosis of the eye were treated with gold therapy with very satisfactory results. In seven of the cases gold was used when other therapy failed. In all cases healing occurred with relative promptness. The cases were under observation from three to nineteen months, and in that time there was one recurrence.
Georgiana D. Theobald.

Michal, F. V. **Aviril in ocular therapy.** Ceskoslovenska Ofth., 1937, v. 3, no. 3, pp. 256-259.

An ointment for treatment of suppurative conditions of the eyelids.
Georgiana D. Theobald.

Natanson, D. M. **Lysozyme in ophthalmology.** Viestnik Opht., 1937, v. 11, pt. 4, p. 501.

The author uses lysozyme with very satisfactory results in chronic dacryocystitis, ulcers, burns, and infected wounds of the cornea, and for preoperative preparation of the conjunctival sac. It exerts a bactericidal effect and acts as an analgesic and as a stimulant to epithelization. Ray K. Daily.

Schweig, S. J. **Filling the conjunctival sac with ointment.** Zeit. f. Augenh., 1938, v. 94, Feb., p. 162.

Friede's description of his method of injecting ointment into the conjunctival sac moves the author to remark that in his opinion one should take precautions to limit the amount of ointment introduced rather than invent a method to increase it. This is particularly true of yellow oxide of mercury, ichthyol, and zinc. Moistening the glass rod with which the ointment is introduced not only facilitates introduction but increases the effectiveness of the ointment. Addition of water to the ointment base also decreases the discomfort caused by it. F. Herbert Haessler.

Sobanski, Januz. **The treatment of ocular tuberculosis with an autovaccine of tubercle bacilli.** Klinika Oczna, 1938, v. 16, pt. 2, p. 155.

During the past year the author used an autovaccine cultured from the blood, and containing 10 to 100 million of killed tubercle bacilli. In twelve cases of various ocular diseases of tuberculous etiology the results were superior and more rapid than those obtained with tuberculin. Several times positive blood cultures for tubercle bacilli were obtained in cases where the tuberculin reaction was negative. Ray K. Daily.

Soil, Elise. **Concerning certain cases of ocular affections of tuberculous origin successfully treated by chrysotherapy.** Bull. Soc. Belge d'Opht., 1937, no. 75, p. 32.

The author reports five stubborn cases of eye disease successfully treated by injections of various preparations of salts of gold. Three were cases of strumous keratitis, two of tuberculous iritis. She concludes that one should not hesitate to use this treatment, especially when all others have failed. The risk of accident will be reduced to a minimum if one takes into account the general condition of the patient. He

should not present any serious lesion, particularly of the kidneys. (2 illustrations, 16 references.) J. B. Thomas.

Trachtenberg, E. A. **Postoperative course of intraocular operations in the presence of Staphylococcus albus hemolyticus.** Viestnik Opht., 1937, v. 11, pt. 4, p. 546.

In the presence of this organism in the conjunctival culture Strachov instills, one-half hour before the operation, one to two drops of 0.5 percent copper-sulphate solution. This study consists of an analysis of the postoperative course of one hundred intraocular operations with positive cultures, treated with Strachov's prophylactic instillation. The conclusions are that the virulence of this organism is low and that in addition to the conjunctival flora the factors influencing the postoperative course are tissue resistance, type of operation, and degree of traumatism. The preliminary instillation of copper sulphate safeguards the postoperative course, and should be done in the presence of staphylococcus albus as well as in cases in which bacteriologic study is not possible. Ray K. Daily.

Vanysek, Jan. **Treatment of external affections of the eye with azotoluendihydrocuprein.** Ceskoslovenska Ofth., 1937, v. 3, no. 4, pp. 318-326.

The remedy named in the title (or "Interazin") in the form of a 1-percent ointment with vaseline and lanolin base, is an especially active antiseptic for the skin. It has a favorable influence on epithelization. The author has used it in corneal ulcers including ulcus serpens, in lid infections, and after extirpation of the lacrimal sac and exenteration of a globe for panophthalmitis.

Georgiana D. Theobald.

Weeks, W. W., and Morris, S. A. **Induced hyperpyrexia in ophthalmology.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 664-666.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Ashdown Carr, T. E. **Congenital word blindness.** Trans. Ophth. Soc. of United Kingdom, 1937, v. 57, pt. 2, p. 579.

Inability or extreme difficulty in learning to read is ascribed to a defect in the visual memory-center or in the fibers connecting with the visual center in the occipital cortex.

These patients can be helped if they realize their difficulty and read or spell aloud, so as to use their auditory memory-center as a portal of entry to their intelligence, or make the appropriate lip movements so as to use the glosso-kinesthetic center as an aid. An interesting letter from a patient is included, describing his difficulty and how he had been able to overcome it to a certain degree by the above suggestions. Beulah Cushman.

Beach, S. D., and McAdams, W. R. **Benzedrine in cycloplegia: 2.** Further report. Trans. Amer. Acad. Ophth. and Otolaryng., 1937, 42nd mtg., p. 179. (See Amer. Jour. Ophth., 1937, v. 21, Feb., p. 121.)

Bothman, Louis. **Refractive errors in the same eyes while under the influence of homatropine, scopolamine, and atropine.** Trans. Amer. Acad. Ophth. and Otolaryng., 1937, 42nd mtg., p. 165. (See Amer. Jour. Ophth., 1937., v. 20, Aug., p. 822.)

Bunge, E. and Heyn, W. **Dark adaptation in poorly pigmented and albinotic**

eyes. Klin. M. f. Augenh., 1938, v. 100, Feb., p. 178.

The eyes of all subjects used were light-adapted by exposure to the Drescher-Trendelenburg apparatus and the course of dark adaptation was measured by means of a calibrated Engelking-Hartung apparatus. Repeated measurements were made on the eyes of eight total albinos, on one subject with albinotic fundi but normal pigmentation elsewhere, on ten normal blonds, and on ten normal brunettes. No difference in any detail of the course of adaptation could be demonstrated.

F. Herbert Haessler.

Dallos, J. **The individual fitting of contact glasses.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 509.

A historical review of the making and fitting of contact glasses is given up to the development of the author's method of individual fitting as published in 1932. This is accomplished by filling an approximately fitting shell with a soft paste of boiled negocoll, cooled to room temperature, then placing it behind the eyelids on the anesthetized eyeball. The negative cast is then filled with a molten paraffin-like substance, hominit, which after setting comes off clearly and gives an exact positive mold. Tedious and meticulous steps are referred to in the discussion but the results are said to justify the procedure.

Beulah Cushman.

Elsberg, C. A., and Spotnitz, H. **The sense of vision.** Introduction and 4 parts. Bull. Neur. Inst. of New York, 1937, v. 6, Aug., pp. 233, 234, 243, and 253.

In the introduction Elsberg states that most writers on the physiology of the visual processes assume that the physiologic and psychologic processes in the visual areas of the brain run so exactly parallel to the processes of the corresponding retinal areas that it is legitimate to infer the nature of the retinal processes directly from the nature of our visual sensations. This point of view can be accepted only with certain reservations. The relative importance for acuity of vision of increase of illumination and of increase of area needs further study. It may be that there are basic differences between diminution of vision due to papilledema and that due to primary optic atrophy. The relative importance for acuity of vision of light and of area may be altered in lesions of the visual pathways or in the occipital lobes. Investigations of visual acuity and of visual fatigability may show differences between lesions in the extracerebral and those in the intracerebral pathways. Therefore, tests of acuity of vision and of visual fatigue might make it possible to localize intracranial diseases.

Part 1 deals with the visual-test object and illumination and its relation to fatigue. It is concluded that various-sized squares are better test objects than letters. (15 references.) Part 2 deals largely with the need for relative increase in illumination as one approaches the threshold of small stimuli. (7 references). Part 3, on the theory of the functions of the retina, is a technical article hardly capable of being abstracted. (12 references.)

Ralph W. Danielson.

Harman, N. B. **The problem of myopia.** (Discussion: see also Henderson and Sorsby.) Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 366.

The author reviews his first report, made in 1907, which gave the impetus for organization of the "myope" or

sight-saving classes in London and elsewhere. He gives the complications in 480 high myopes, and concludes that conservation of vision through a lifetime should be the aim of the ophthalmic surgeon. Beulah Cushman.

Henderson, Thomson, **The problem of myopia.** (Discussion: see also Harman and Sorsby.) Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 397.

The author characterizes myopia as being a stigma of constitutional weakness. He feels that his clinical findings prove accommodation has no influence in raising intraocular pressure and inducing myopia. Beulah Cushman.

Hoehne, H. **Reflex purposive movements for the improvement of visual perception in the infant.** Zeit. f. Augenh., 1938, v. 94, March, p. 241.

In a child with congenital corneal opacities, optic iridectomy had been performed in early infancy. When the child returned to the clinic at the age of nine months, the amblyopic nystagmus had disappeared and the child had developed a peculiar habit which was interpreted as a conditioned reflex. Whenever stimulated to try to see, whether by light, movement, or sound, the child pulled down both lower lids with its fists, obviously to free optically the coloboma, which otherwise was covered by the lower lid upon trying to look down. F. Herbert Haessler.

Hughes, C. A. **A practical problem in color blindness.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 1, p. 341.

A man of 56 years had for 25 years passed the railway tests for color vision with wools and flags, and had passed the lantern test in 1930, but failed in 1935 with the flag and Ishihara tests. The question is raised whether the color tests are becoming too strict, or whether a slight head contusion in 1934 could have produced the change. There had been no reduction in vision.

Beulah Cushman.

Karpe, Gösta. **An investigation on movement of the reflex on the posterior surface of the lens in accommodation.** Acta Ophth., 1938, v. 16, pt. 1, p. 125.

A review of the literature and a detailed report of the author's investigation. The study was made on nine persons between nine and twelve years of age. The statistical report shows that the changes in form and position of the posterior surface of the lens during accommodation are greater than those found by Helmholtz and Gullstrand. This applies to the change in curvature as well as to the axial movements of the posterior pole of the lens. Individual variations in the changes produced by accommodation are very marked.

Ray K. Daily.

Kravkov, S. V. **Physiologic optics in the Soviet during the last twenty years.** Viestnik Opht., 1937, v. 11, pt. 4, p. 468.

A review of the contribution of Soviet ophthalmologic research institutions in this field. Ray K. Daily.

Motolese, Alfonso. **Surgical treatment of high myopia.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 132-136.

As a result of many years of clinical research at the ophthalmologic clinic of Florence, under the direction of Bardelli, the author favors in high myopia discission of the lens, followed in a few days by aspiration of the opaque lens material. Loss of vitreous and detachment of the retina are not encountered

often enough to constitute a hazard. Good and lasting results are obtained.

Clarence W. Rainey.

Reis, Wiktor, **Dynamic skiascopy.** Klinika Oczna, 1937, v. 15, pt. 6, p. 659.

A description of the Cross method of dynamic skiametry. Ray K. Daily.

Samoilov, A. I. **The Nagel anomaloscope in the study of disturbances of color perception.** Viestnik Opht., 1937, v. 11, pt. 4, p. 479.

An exhaustive description of the instrument and its application. The author believes that exact data are obtained only with the anomaloscope, and he pleads for its extensive application in ophthalmologic practice.

Ray K. Daily.

Sattler, C. H. **Experience with contact glasses.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 172.

Zeiss contact glasses with an inner radius of 7.5 to 8.5 mm. for the corneal part are more useful than afocal contact glass. Glasses with these radii are tolerated better than those with shorter or longer radius. Most patients (74 of 96) were best fitted with a glass whose haptic portion had a radius of 12 mm. The other 22 patients required a radius from 11 to 12.5 mm. The author never prescribes a glass until it has been worn for five hours without discomfort, and has never noted eye injury from a contact glass. When Zeiss glasses cannot be worn because of irregular curvature of the anterior segment of the eye, he uses blown glasses made from a negocol cast of the eyeball. In one patient he successfully used a contact glass as one element of a telescopic system.

F. Herbert Haessler.

Sorsby, Arnold. **The problem of myopia.** (Discussion: see also Harman and Henderson.) Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 379.

The mechanical theory of myopia and the conception of axial elongation in myopia are discussed. They have proved too simple for acceptance according to recent reports quoted by the author. He feels that genetics is revealing the secrets of the uneven distribution of myopia in different social strata and racial groups. Beulah Cushman.

Titoff, I. G. **The refraction curve in adults and in the new-born.** Viestnik Opht., 1937, v. 11, p. 5, p. 591.

A review of the literature and a detailed report of the author's own investigations. The material consisted of 1,000 adult patients in the gynecological, neurological, and surgical services, and 100 eyes of five-day-old infants. The data in adults were obtained by skiascopy under atropine, the Rodenstock refractometer, and subjective examinations. The refraction of infants was determined by skiascopy. The graphed findings show that the refraction curve of adults under atropine differs from the binomial curve by a sharp asymmetry and height of apex. The curve retains these characteristics even when myopes over six D. are excluded from the material. The characteristics are due in part to variations in axis, and in part to correlation of the various elements of the optical apparatus. The refraction curve of infants coincides with the normal binomial curve. A comparison of the curves of the newborn and the adult shows that the characteristics of the adult curve are not congenital but develop in later life. The rôle played by hereditary factors and external environment in the develop-

ment of the adult curve will be determined by a study of the refractive curve at various ages. Ray K. Daily.

Wachtel, Filip. **Zeiss and Dallos contact glasses.** Klinika Oczna, 1938, v. 16, pt. 2, p. 183.

A comprehensive discussion of the indications and use of the Zeiss and Dallos contact lenses. The author, himself a sufferer with bilateral keratoconus, describes in detail his own experience with both types of lens. The Zeiss lenses restored his visual acuity but required an anesthetic and after several hours irritated the eyes. The lenses prescribed by Dallos were comfortable and in every respect satisfactory. Ray K. Daily.

4

OCULAR MOVEMENTS

Amorim, T. U. **Remarks about the use of Barraquer's myocampter.** Trabalhos do Primeiro Cong. Brasileiro de Opht., São Paulo, 1936, v. 1, pp. 129-133.

The author has used Barraquer's myocampter in several dozens of cases for the treatment of strabismus, with satisfactory results. When the deviation is over 10°, the author combines it with tenotomy of the opposite muscle. Four cases are reported.

Ramon Castroviejo.

Berens, Conrad. **Tenon's-capsule transplants in surgery of the ocular muscles, with especial reference to postoperative deviations with adhesions between the muscles and the eyeball.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 536-543.

Chavasse, F. B. **The transconjunctival approach to the inferior oblique muscle.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 448.

The author describes graphically with illustrations a modification of Landolt's operation for tenotomy of the inferior oblique. The approach is through the lower conjunctival sac. Indications for the operation are: ocular torticollis associated with overaction of the inferior oblique; cases of pronounced strabismus convergens sursoadductorius, preferably after correction of the horizontal element; and cases of paralysis of the superior rectus.

Beulah Cushman.

Chetverikova, V. I. **A rare case of dichlorethylsulphide poisoning.** Viestnik Opht., 1937, v. 11, pt. 6, p. 895.

A report of a case with vascular changes at the limbus, chorioretinitis, perivasculitis, and paresis of the external recti. The symptoms are explained by a toxic action on the sympathetic. The vascular tonus is disturbed, leading to dilatation and stasis, and these are the basis of the changes in the cornea and fundus. The pathogenesis of the abducens paresis is not clear.

Ray K. Daily.

Curti, Giuseppe. **Voluntary oscillations of the eyeballs.** Riv. Oto-Neuro-Oft., 1937, v. 14, July-Aug., pp. 406-409.

A phrenasthenic epileptoid boy of fourteen years, mentally bright but with degenerative somatic characteristics, showed the following conditions: slight defect of left 6th and 7th nerves with left internal strabismus and homonymous diplopia upward, from paresis of the left inferior oblique muscle. A peculiar phenomenon was that he was able to provoke at will rapid oscillations of the globes in the horizontal plane. He was unable to provoke such movements separately in

one eye. During such action the patient was under the impression that objects moved in an undulatory way. He was able to start, interrupt, and retard these movements at will. The writer discusses the basis of the phenomenon. (Bibliography.)

M. Lombardo.

Fisher, E. M. **Surgery of concomitant strabismus.** Viestnik Opht., 1937, v. 11, pt. 6, p. 830.

Analysis of the results of seven hundred cases leads the author to the following conclusions. Unilateral tenotomy is effective in 10 to 20-degree convergence, but exact control of the effect is impossible and restriction of adduction may lead to late postoperative divergence. Bilateral tenotomy is contraindicated in childhood, because of the weakening of convergence. In convergence of less than 20 degrees, particularly in cases favorable to restoration of binocular vision, bilateral advancement is preferable to tenotomy. Unilateral resection with tenotomy is suitable in 30 to 40-degree convergent strabismus, but the results are better with bilateral advancement followed later by tenotomy if necessary. In primary divergent strabismus the best results are obtained from advancement and resection of the interni, combined with tenotomy of the externi for high degrees. Postoperative divergence is repaired by advancement of the tenotomized interni. Tenotomy of the externi should be done cautiously if at all, because the primary tendency to convergence may lead to return of the original convergent strabismus.

Ray K. Daily.

Giri, D. V. **A new method of advancement with a single one-armed suture.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 567.

Sutures are placed in the exposed muscle raised gently with squint hooks, and are passed through the conjunctiva, whereupon the muscle is divided about 3 mm. in front of the suture loops and is then reattached close to the limbus. These procedures cause little pain, and the muscle tissue is not traumatized. (Illustrations.) Beulah Cushman.

Jayle, G. E. **Introductory essay on the study of the pathways and centers of conjugate movement of the eyeballs.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, May, p. 401.

This field of study has been dominated by the classical notions of Grasset and Landouzy, in spite of the just criticisms of Velter and all the modern researches and findings. After briefly summarizing the thesis of Grasset and Landouzy, the author criticizes it and argues for (1) a specificity of oculogyric motility in regard to somatic movement, (2) a specificity of oculogyric movement in one of the planes of space in regard to that which is manifested in the other two planes, and (3) the importance of the subcortical factors in regulation of this movement. (Illustrations.) Derrick Vail.

Law, F. W. **On the value of orthoptic training.** Brit. Jour. Ophth., 1938, v. 22, April, pp. 193-204.

The author made a thorough study of 124 squint cases. Twenty-two were considered cured by orthoptic training. Of these four had operation in addition to the training. The author feels that while orthoptic training is indicated in certain cases its value is overemphasized. He further concludes that more cases of squint can be cured by proper

glasses and occlusion than is generally supposed. (Tables.) D. F. Harbridge.

Miklós, Andor. **An Instance of voluntary nystagmus.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 186.

A colleague, knowing of Miklós' interest in nystagmus, presented himself to show that he could voluntarily produce nystagmus. He could at first do this only with his eyes open and in primary position, but with practice he has acquired the ability to produce pendular movements of his eyes (500 to 600 per minute with an amplitude of 1 or 2 mm.) at any time and with his eyes in any position. The theoretically probable mechanism is discussed.

F. Herbert Haessler.

Paleari, Antonio. **The ocular syndrome in myasthenia.** Riv. Oto-Neuro-Oft., 1937, v. 14, July-Aug., pp. 356-365.

In six patients aged from 24 to 60 years, affected by myasthenia, the ocular symptoms were first to appear, and in three cases these symptoms remained completely isolated for a long time before the general symptoms of the disease became manifest. The ocular symptoms were in the form of paresis or paralysis of a few or all the eye muscles, starting with ptosis and vertical diplopia. If the real genesis of similar isolated ophthalmoplegias is obscure, causing errors of interpretation, it will become clear under the action of prostigmia, which abolishes all motor disturbances, pointing to mesencephalic localization of the process which gives rise to the myasthenia syndrome. (Bibliography.) M. Lombardo.

Prangen, A. DeH., and Koch, F. L. P. **Divergence insufficiency: a clinical study.** Amer. Jour. Ophth., 1938, v. 21, May, pp. 510-515; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 136.

Prins, C., Jr. **Immediate disappearance of strabismus with correcting spectacles.** Klin. M. f. Augenh., 1938, v. 100, Feb., p. 260.

The author reproduces four series of photographs and gives a brief description of a child whose strabismus disappeared the moment she put on her correcting lenses and reappeared when they were taken off.

F. Herbert Haessler.

Weckert. **Fusion center and squint.** Zeit. f. Augenh., 1938, v. 94, March, p. 258.

An essay pointing out the importance of early treatment of squint. The squint is merely an indication that something is interfering with the possibility of binocular single vision, and the purpose of therapy is to make binocular single vision possible.

F. Herbert Haessler.

5

CONJUNCTIVA

Adamantiadis, M. **Some clinical questions regarding trachoma.** Rev. Internat. du Trachome, 1937, v. 14, Oct., p. 241.

The author discusses in some detail, and reports cases to illustrate, several conditions associated with trachoma.

J. Wesley McKinney.

Ajo, Aarni. **The future of phlyctenulosis patients, with special reference to tuberculosis.** Acta Ophth., 1938, supplement 15.

This is a detailed report of a follow-up investigation of the phlyctenulosis patients seen at the Helsinski Eye Clinic from 1912 to 1927. The total number of patients was 449, of which 220 were women. The follow-up questionnaire traced 367, of which 173 were

women. Of these 367, 55 or 14.99 percent had died, with tuberculosis as the cause of death in 35 and the probable cause of death in 4 cases, making the total mortality from tuberculosis 10.62 percent. In comparison with the mortality rates of Finland this group has a somewhat higher general mortality rate, and almost double the mortality rate from tuberculosis. Of the patients living, one hundred were available for physical examination. Fifty of these were free of symptoms, 39 had tuberculous lesions, five probably had tuberculous lesions, and six had other pathologic conditions. Seven patients had tuberculosis of the lungs, which had set in ten years after the phlyctenulosis. These findings lead the author to conclude that phlyctenulosis does not protect the patient against a graver form of tuberculosis later in life.

Ray K. Daily.

Argaud, R., and Berges, R. **Anatomopathologic consideration of conjunctival xerosis.** Arch. d'Opht.-Rev. gén. d'Opht., 1938, v. 2, Feb., p. 97.

Thorough histologic study of xerotic plaques removed from the conjunctiva of two male patients showed that a part of the chorion was sharply divided from the deeper part by a different process. In one part there was overdevelopment of the elastic fibers, while in the other part there were many collagen fibers. The latter fibers predominated. The Malpighian cells divided directly, often in the form of plasmodial layers with all the morphologic modalities of necrosis and proliferation. The superficial epithelial cells of the conjunctiva became keratinized. (Illustrations, bibliography.) Derrick Vail.

Busacca, Archimede. **Observations on the culture of trachomatous tissues by Carrel's method.** Arch. d'Opht.-Rev. gén. d'Opht., 1938, v. 2, Feb., p. 116.

Until recently the results of the works of the various investigators using Carrel's method have been contradictory. The author attributes this discrepancy to difficulty of the technique, particularly in keeping the tissue sterile. He describes his method of culture, which consists briefly in rendering the conjunctival sac as sterile as possible with 2-percent silver nitrate, followed in fifteen minutes by frequent flushing of the conjunctiva, and later by instillation of 4-percent mercurochrome solution. A piece of the conjunctiva is removed from the upper fornix without anesthesia, in order to avoid any possible deleterious action of cocaine. (The author believes, however, that this factor is of no importance.) The pieces of tissue are then washed many times in Ringer's solution and cut into small thin strips. The greatest difficulty of the method resides in interpretation of what is seen. Sometimes it is impossible to differentiate alterations attributed to disease of the cells from those due to degeneration and age of the culture. A part at least of the formations described in the literature as being Prowazek bodies are due to alterations of the zone of the centrosphere. It is only by study of the living culture that one can determine the vitality and capacity for multiplication of the corpuscles interpreted as rickettsias. In the fixed specimen a large number of the cellular granulations, which may be normal or pathologic, can be confused with rickettsioid bodies. (Illustrations, bibliography.) Derrick Vail.

Cecchetto, Ezio. **A case of vernal catarrh with deposits of hemosiderin in the conjunctiva.** Rassegna d'Ottal., 1937, v. 6, Nov.-Dec., p. 651.

A patient suffered for many years from a moderately severe form of spring catarrh of the palpebral type. There was a gradual clearing up without any specific treatment, and for some time the patient was symptom-free. A few years later she returned because of a gritty sensation, and examination showed many small brownish-black concretions in the conjunctiva of the upper lid. Chemical study proved the substance to be hemosiderin, probably derived from the blood at the bases of the old hypertrophied papillae. (one color figure.) Eugene M. Blake.

Cornet, Emmanuel. **Syphilitic palpebro-conjunctivo-corneal elements in trachoma.** Rev. Internat. du Trachome, 1937, v. 14, Oct., p. 264.

Syphilis may produce follicular conjunctivitis, papillary conjunctivitis, tarsitis, ulcerative blepharitis, and interstitial keratitis. It is important to recognize such syphilitic manifestations complicating trachoma, which will not be cured until the syphilis is treated.

J. Wesley McKinney.

Cornet, Emmanuel. **Trachomatous and nontrachomatous elements in persons afflicted with trachoma.** Rev. Internat. du Trachome, 1937, v. 14, Oct., p. 258.

The various morbid conditions associated with trachoma are analyzed in order to present a clear conception of the clinical picture.

J. Wesley McKinney.

Cuénod, A., and Nataf, R. **New experimental data and the treatment of trachoma.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 83-91.

The authors believe that the body louse has served from time immemorial as the reservoir for trachoma, and that infection is spread by louse feces under the nails, by scratching and rubbing. The offending organism is Rickettsia prowazeki, and the trachoma nodules of the conjunctiva are called rickettsiomas. Prophylactic measures against the disease should be in general the same as those against typhus fever. The manners and hygiene of whole populations should be altered, and disinfection of the clothing should be a matter of law. For local therapy the authors use the time-honored copper sulphate, and also surgical measures. Their method is to follow curettage with an injection of a 0.5 percent watery solution of phenol into the deep layers of the conjunctiva of the upper lid at the border of the tarsus, into the depth of the lower cul-de-sac, and into the semilunar fold. An injection of a solution of oxycyanide of mercury is made at the corneal limbus. The authors describe the cure of 48 out of 50 trachomatous children, in a period of six months, using 0.5 percent phenol alone by topical application to the conjunctiva. Clarence W. Rainey.

François, Jules. **Familial hemorrhagic angiomatosis and its ocular complications.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, May, p. 425.

This condition, known as Rendu-Osler's disease, is characterized by three fundamental symptoms: the existence of telangiectasis, appearance of accidental hemorrhages, and the familial character. The signs, symptoms and nature of the affection are described and a case reported in a woman of 74 years, who presented the classical signs. The telangiectasis of the conjunctiva assumed a daisylike appearance, while those of the skin were stellate with irregular branches. No specific treatment exists. (Illustrations, bibliography.)

Derrick Vail.

Grüter, Wilhelm. **The microstructure of epithelial cells and its importance for the etiology of trachoma.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 300-303.

The author's investigations and experiments lead him to believe that Golgi's apparatus is not an artificial product of staining but a substantial nuclear structure of characteristic shape and fissiparism. Trachomatous epithelial cells could not be shown to contain any abnormal granular structures. Observations are presented and conclusions drawn. D. F. Harbridge.

Grzedsielski, Jerzy. **New agents in the therapy of trachoma.** Klinika Oczna, 1938, v. 16, pt. 1, p. 119.

A comprehensive review of the literature. Ray K. Daily.

Julianelle, L. A., Sory, R., Smith, J. E., and Lange, A. C. **The effect of tartar emetic on the course of trachoma.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 651-657.

Kerszman, Joseph. **The value of gonococcus vaccine in the treatment of blennorrhea neonatorum.** Klinika Oczna, 1937, v. 15, pt. 6, p. 714.

The author treated 54 cases of ophthalmia neonatorum with excellent results by alternate injections of gonococcus vaccine and milk, aided locally by irrigations of potassium permanganate and collargol salve. This eliminates the use of silver nitrate and manipulation of the lids. It will serve especially well for the rural population, to which is available only the assistance of general practitioner and midwife.

Ray K. Daily.

Kronfeld, P. C. **The trachoma situation in China.** Surg. Gynec. and Obstet., 1938, v. 66, Feb. 15, p. 389.

It is estimated that one third of the population of China suffers from trachoma. Infection occurs by direct transfer of virus from one patient to another. The direct transfer is favored by the great scarcity of water with resultant uncleanliness. Trachoma in China is of a mild character and has a tendency to eliminate itself. A sequela of trachoma which is characteristic for China is plasmoma of the conjunctiva—a tumor mass of densely packed plasma cells which arises from the fornices or from the semilunar fold. These do not respond to radiation with radium and have to be removed surgically. Local recurrences are rare. The form of treatment found most satisfactory for trachoma is alternation of treatment periods with copper sulphate, mercury bichloride, and chaulmoogra-oil rubs, combined with grattage.

Edna M. Reynolds.

Neuman, Jakub. **Rapid and successful cure of trachoma with modified Busacca method.** Klinika Oczna, 1937, v. 15, pt. 5, p. 625.

Neuman substituted tincture of iodine for the mercury sublimate in the Busacca treatment of trachoma. Under this treatment papillary hypertrophy diminishes, and the granulations, infiltrations, and corneal ulcers rapidly disappear. A tabulated report of 44 cases shows the average duration of treatment in uncomplicated cases to be five weeks and in complicated cases seven and a half weeks. Ray K. Daily.

O'Brien, C. S., and Allen, J. H. **Staphylococcus conjunctivitis.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 641-645.

Shimkin, N. I. **Antepositio conjunctivae fornicis: operation in severe cases**

of spring catarrh. Brit. Jour. Ophth., 1938, v. 22, May, pp. 287-295.

The author discusses the pathology in severe cases of spring catarrh. There is hyaline degeneration of the subconjunctival tissue. The writer advises removal of the diseased tarsal conjunctiva and bringing down normal conjunctiva from the upper fornix to cover the denuded area. The five steps of the operation employed are fully described. Results in 29 cases are cited, satisfactory from both the therapeutic and the cosmetic points of view. (Figures.)

D. F. Harbridge.

Simon, F. A. **Allergic conjunctivitis due to fungi.** Jour. Amer. Med. Assoc., 1938, v. 110, Feb. 5, p. 440.

A man aged 38 years gave a history of recurring attacks of redness, itching, and burning of the eyes of four years duration. The attacks were limited almost entirely to the summer and fall seasons. Skin tests for many pollens were positive, but the time of appearance of symptoms did not coincide with the pollenation season. Fungi were recovered in bacteriologic tests about the patient's home (a very old, damp, brick house surrounded by trees), and the patient was definitely skin-sensitive to extracts of Alternaria and of Cladosporium. All the clinical symptoms of the conjunctivitis were reproduced by application of fungus extract to the conjunctiva (the control conjunctival test in a nonsensitive subject being negative). Desensitization with fungus extracts was followed by relief of symptoms.

George H. Stine.

Sjögren, Henrik. **On keratoconjunctivitis sicca.** Acta Ophth., 1938, v. 16, pt. 1, p. 70.

This, the fourth in a series of articles on the subject, reports the microscopic changes in the initial stage of the disease. Eight photomicrographs show that the change in the lacrimal gland begins as destruction of the glandular epithelium and tubuli. In healthy tissue are seen small foci of round-cell infiltration, which on larger magnification prove to be parenchyma cells, without round-cell invasion. Only in late stages does round-cell infiltration appear. New connective tissue formation is seen early. This histologic picture demonstrates that the primary and characteristic change in the syndrome is degeneration of the glandular parenchyma. These changes are not indicative of a reaction to bacterial invasion.

Ray K. Daily.

Sjögren, Henrik. **On keratoconjunctivitis sicca.** Acta Ophth., 1938, v. 16, pt. 1, p. 80.

This, the fifth in a series of articles on the subject, deals with the ocular changes produced by excision of the lacrimal gland. A patient 44 years of age developed a typical picture of keratoconjunctivitis sicca after excision of an orbital tumor which included the lacrimal gland. A biopsy of the bulbar conjunctiva was taken temporally and nasally from the cornea. The microscopic examination showed degeneration of the elastic substance and hydropic degeneration of the conjunctival epithelium. The symptoms were completely relieved by diathermic coagulation of the lacrimal puncta, with only the mucous character of the conjunctival secretion remaining unchanged.

Ray K. Daily.

6

CORNEA AND SCLERA

Amsler, Marc. **Early keratoconus.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 100-114.

Since the keratoscope of Placido, the ophthalmomometer of Javal, and skiascopy are satisfactory means of examination, the author is astonished at the frequency with which keratoconus, especially of mild degree, is overlooked. Using a Placido disc with a photographic attachment, the author photographed various types of corneal deformity. For study purposes he divides cases of keratoconus into four groups or degrees. The first is early or abortive keratoconus distinguished by deflection of the horizontal limb of the light reflex by 1 to 3 degrees. The second group is characterized by an angle of deflection of 5 to 8 degrees. These two groups comprise 75 percent of the 165 eyes studied. In the third and fourth types the angle of deflection is greater, and corneal opacities are present. The vision in the first two groups can be much improved by lenses, and by contact glasses. When opacities were present the vision could not be improved.

Clarence W. Rainey.

Anderson, F. A. **Ochronosis.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 591.

Ochronosis, first described by Virchow in 1866, is associated with an error of metabolism known as alcaptonuria. A case is described, with a colored illustration of the slaty sclerotics and slaty-purple staining over the insertions of the lateral recti. Bluish discoloration of the aural and nasal cartilages was present, and the skin of the axillae showed chromidrosis.

Beulah Cushman.

Avgoushevich, P. L. **Optical iridectomy.** Viestnik Opht., 1937, v. 11, pt. 6, p. 847.

Analysis of the results of 78 operations shows that the indications for the operation are very limited. In cases of leucoma with iris and lens complications, and of diffuse corneal opacities, vision shows no perceptible improvement after the operation. Its only indications are central corneal opacities.

Ray K. Daily.

Bossalino, G. **Three observations of anterior sclero-uveitis etc.** Arch. di Ottal., 1937, v. 44, Nov., p. 313.

Clinical, histopathologic and bacteriologic studies of three enucleated eyes. The author describes three cases of sclero-perikeratitis of Szily, of which only one was cured of the affection. In two other cases, one unilateral and the other bilateral, the disease presented itself with malignant characteristics, making it necessary to enucleate the eyes. The author believes that the initial affection was in the sclera and was of a tuberculous nature. He was able to reproduce tuberculous lesions and to culture acid-fast bacilli.

H. D. Scarney.

Johnson, L. V. **A pannus-forming infection of sheep eyes.** Proc. Soc. Exper. Biol. and Med., 1938, v. 38, Feb., p. 42.

This is a preliminary report of a disease of the conjunctiva and cornea of sheep which results in formation of a pannus similar to that seen in human trachoma. The disease can be transmitted from sheep to sheep but infection has not been brought about in other animals. Follicles are not a prominent feature and are confined to the fornix. Slitlamp examination suggests that the vessels start in an arrangement similar to the spacing of the corneal nerves. Edna M. Reynolds.

Kashuk, M. E. **Marginal degeneration of the cornea.** Viestnik Opht., 1937, v. 11, pt. 6, p. 889.

A report of a case in a man 43 years of age in whom the disease began at the age of nineteen years. From a study of 130 case reports in the literature, Kashuk differentiates four stages of the disease. In the first stage there is peripheral vascularization and opacification. In the second stage there appears a peripheral groove which becomes vascularized. This stage lasts from ten to twenty years. In the third stage the thinned portion of the cornea becomes ectatic. In the fourth stage the entire cornea becomes ectatic, simulating keratoconus. Ray K. Daily.

Khoroshina, A. G. **The results of optical iridectomy.** Viestnik Opht., 1937, v. 11, pt. 6, p. 841.

The writer points out the factors which account for disappointing results in optical iridectomies, and expresses the hope that this operation will be replaced by corneal transplantation.

Ray K. Daily.

Krachmalnikov, L. L. **Diagnosis, classification, and therapy of keratitis rosacea.** Viestnik Opht., 1937, v. 11, pt. 6, p. 783.

A description of the clinical forms of the disease. The two symptoms emphasized by the author as characteristic of the disease are the hooked short pannus vessels, and the appearance of broken marble in the necrotic foci.

Ray K. Daily.

Schell, Michal. **Episcleritis metastatica furunculiformis.** Klinika Oczna, 1937, v. 15, pt. 5, p. 587.

The literature contains 22 case reports of this disease, as described by Kraemer in 1921 (see Ophth. Year Book, 1922, v. 18, p. 170). The patient, 37 years old, gave no history of preceding infection. He had a painful scleritic nodule and iritis. The nodule perforated spontaneously, with a purulent discharge. The eye recovered after five weeks with normal vision and with a depressed scleral cicatrix.

Ray K. Daily.

Weekers, M. L. **Treatment of pannus by means of marginal incision of the cornea.** Bull. de la Soc. Franç. d'Opht., 1937, v. 50, pp. 880-882.

After local anesthesia of the conjunctiva by means of 4-percent-novocaine solution hypodermically, the authors incise the conjunctiva parallel to the limbus and at a distance of 2 or 3 mm. from it, and reflect the flap over the cornea. Then with a cataract knife they incise the corneal layers as in the Elliot operation. The corneal flap is cut off, laying bare the globe. Postoperatively, progressive atresia of the vessels in the cornea can be seen. In ten cases reported upon the vision was improved, in some cases quite appreciably.

Clarence W. Rainey.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Andersson, Einar. **Is perforation of the eyeball essential for development of sympathetic ophthalmia?** Acta Ophth., 1938, v. 16, pt. 1, p. 119.

A three-year-old child was struck in the right eye with a stone from a popgun. Hemorrhage into the anterior chamber, with hypertension, was followed by hemosiderosis of the cornea, with hypotony. Three months later the left eye developed sympathetic ophthalmia, and was destroyed in spite of treatment and of enucleation of the injured eye. Careful study of the latter failed to show any perforation of the eyeball.

The tuberculin test was negative. (Photomicrographs.) Ray K. Daily.

Bahr, Gunnar. **A case of uveoparotid fever with perivasculitis and other rare symptoms.** Acta Ophth., 1938, v. 16, pt. 1, p. 101.

A report of a case of uveoparotid fever, with swelling of the parotid glands, iridocyclitis with yellowish nodules in the iris, perivasculitis of the fundus, and nodules of Krause's glands. Animal inoculation from the palpebral nodules was negative for tuberculosis, although the tuberculin test was positive. Microscopically the nodules resembled benign lymphogranulomas, consisting of epithelioid cells, and giant cells without caseation. (Illustrations.) Ray K. Daily.

Bossalino, G. **Three observations of anterior sclero-uveitis etc.** Arch. di Ottal., 1937, v. 44, Nov., p. 313. (See Section 6, Cornea and sclera.)

Koslowski, Bogumil. **The sedimentation reaction in uveitis.** Klinika Oczna, 1938, v. 15, pt. 6, p. 681.

A tabulated report of 97 tests in uveitis of various etiology shows that sedimentation of the red blood cells is accelerated in uveitis of tuberculous, specific, and rheumatic etiology, and remains normal in cases caused by focal or dental infection. The author concludes that the test is of value in differential diagnosis. Ray K. Daily.

8

GLAUCOMA AND OCULAR TENSION

Karbowski, M. **Ionization in ophthalmology.** Klinika Oczna, 1937, v. 15, pt. 5, p. 572.

The author is very enthusiastic about adrenalin ionization, which attains the results of subconjunctival injections of adrenalin, without the disagreeable constitutional symptoms incident to such injections. In glaucoma he urges the use of calcium and adrenalin at the posterior segment of the eyeball, and pilocarpin at its anterior portion. Four brief case reports illustrate the favorable results. Ray K. Daily.

Koslowski, Bogumil. **Hydrophthalmos and megalocornea.** Klinika Oczna, 1938, v. 16, pt. 1, p. 1.

Twelve brief case reports of hydrophthalmos and two of megalocornea, with detailed reports of the histopathology of two enucleated hydrophthalmic eyes. Histologic sections show in one case lesions of the angle of the anterior chamber, absence of Schlemm's canal, deficiency of vascular development in the anterior portion of the globe, and fetal structure of the uveal and scleral tissues. The sections of the other eye show no developmental anomalies, and the author makes the diagnosis of a secondary hydrophthalmos. The results of the surgical procedures used in these cases—trephine operation with peripheral iridectomy, cyclodialysis—show that these operations fail to arrest the progress of these diseases. Ray K. Daily.

Malling, Birger. **Investigations on so-called capsular glaucoma.** Acta Ophth., 1938, v. 16, pt. 1, p. 43.

This is a report of a series of investigations with the objective of clarifying the relation of exfoliation of the lens capsule to glaucoma. The first factor investigated was the frequency of precipitates on the posterior corneal surface in glaucoma. The material consisted of 307 eyes of 181 glaucoma patients. Of these, 102 eyes had capsule changes and posterior corneal precipi-

tates, 73 had capsular changes with no precipitates, 58 had precipitates and no changes in the lens capsule, and 74 had no precipitates and no capsule changes. Of 100 normal eyes examined as a control, 21 had some precipitates and 79 were free from them. Two eyes with precipitates had exfoliation of the lens capsule. The marked prevalence of these precipitates in glaucomatous eyes justifies the conclusion that posterior precipitates in glaucoma are to be regarded as products of a pathologic process. Inasmuch as such precipitates are a product of the uvea the next problem was determination of the activity of the uvea under these conditions. As criteria were taken the fall in intraocular tension and the recovery curve produced by compression. The curve in ten young and ten old eyes shows the compression fall in intraocular tension greater in the young than in the old. To the author this indicates that drainage of intraocular fluids is better in the young than in the old, and this retarded drainage in old people may explain their predisposition to glaucoma. Eyes of elderly people with posterior precipitates show a definite tendency to react to compression in the same manner as glaucomatous eyes. The same is true of eyes with exfoliation of the lens capsule, with or without precipitates. Ten eyes with capsular glaucoma showed lack of uniformity in their response to this test, and gave no indication of disturbance in their drainage facilities. From these studies, the author concludes that posterior corneal precipitates, capsule changes, and glaucoma emanate from the same uveal process. While exfoliation of the lens capsule may not cause glaucoma, its presence indicates that we are dealing with an eye which has a predisposition to glaucoma. Ray K. Daily.

Wilczek, Marian. **Primary glaucoma in the Cracow eye clinic.** Klinika Oczna, 1937, v. 15, pt. 5, p. 517.

An analysis of the material between 1931 and 1936, which consisted of 102 patients; 45 percent of them blind in one or both eyes, 33 percent having absolute glaucoma in one eye, and 13 percent totally blind. The ratio of women patients to men was 2.3:1, and the disease began at an earlier age in women. Ten cases of inflammatory glaucoma, treated with iridectomy from six to nineteen years previously, had slow but progressive degeneration of visual acuity and fields. Although 68 patients were operated upon, the small number that could be followed up does not permit of conclusions.

Ray K. Daily.

9

CRYSTALLINE LENS

Butler, T. H. **Lenticonus posticum and allied anomalies at the posterior pole.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 412.

In a discussion of complicated lens changes four case reports of posterior subcapsular changes were given. One case, occupational in origin, had the changes at the posterior pole accompanied by lamellar separation anteriorly. A diagram of a radiation cataract with reduplication of the posterior capsule was shown. Beulah Cushman.

Kolen, A. A. **Extraction of dislocated and complicated cataracts.** Viestnik Opht., 1937, v. 11, pt. 6, p. 807.

The author's technique includes akinesis, superior-rectus suture, retrobulbar injection, the fashioning of a conjunctival flap and introduction of sutures, limbus incision from without with a scalpel until only a thin layer of

tissue remains, making a small opening through this layer into the anterior chamber, extension of the opening with scissors, iridectomy, and extraction of the dislocated lens by expression or loupe. A tabulated report of nine operations shows that in eight the eyeballs were saved from iridocyclitis and glaucoma. The author used the same technique with a satisfactory result in a case of diabetic cataract in a patient twenty years of age. Ray K. Daily.

Krishnaswami, C. V. **Intracapsular expression of cataract.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 274-282.

Claiming nothing new, the author describes a procedure which differs materially from that of Smith, whose technique the essayist had intended to follow upon becoming an eye specialist. The lens is removed under graduated pressure. Smith's operation and the author's technique are both described, the latter in detail. (Figures, tables.)
D. F. Harbridge.

Madroskiewicz, Marian. **Lentiglobus anterior.** Klinika Oczna, 1937, v. 16, pt. 2, p. 159.

A report of a right unilateral lentiglobus anterior in a 27-year-old man with Bright's disease. His four brothers died at the ege of 21 years of nephritis. The patient complained of deterioration of vision since the onset of the nephritis, one year ago. On examination he was found to have on the right lens an anterior protrusion extending 1 mm. in front of the iris and containing two opacities. The left eye had a small capsular and subcapsular cataract. The author attributes this anomaly to swelling of the lens fibers which caused increased tension within the lens capsule, pushing it forward and rupturing it. Thirteen cases of this anomaly are recorded in the literature, two being unilateral. (Illustrations.) Ray K. Daily.

Motolese, Alfonso. **Surgical treatment of high myopia.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 132-136. (See Section 3, Physiologic optics, refraction, and color vision.)

Onfray, R., and Gilbert-Dreyfus. **Dinitrophenol cataracts.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 114-125.

Case histories of two patients are given. The authors think that the cataracts, and also the occasional occurrence of acute ocular hypertension, may be due to disturbed water metabolism of hepatic origin.
Clarence W. Rainey.

Stallard, H. B. **A corneo-scleral suture in cataract extraction.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 269-273.

Stating that the literature does not comment fully on the gains to be obtained from the use of this suture, the author proceeds to describe the advantages in detail, on the basis of 107 cases of cataract extraction. The suture was found of especial value in elderly persons, and where loss of vitreous was anticipated. No disaster was encountered in the 107 cases in which it was used. There was also no postoperative hyphema in these cases. The technique is described. (Figures.)
D. F. Harbridge.

Szymanski, J. **A forceps to replace sutures of the lid and superior rectus in cataract extraction.** Klinika Oczna, 1938, v. 16, pt. 1, p. 70.

The author has devised a catchless forceps, which grasps the superior rectus and retracts the upper lid. (Illustrations.) Ray K. Daily.

Szymanski, J. **Simplified vacuum syringe.** Klinika Oczna, 1938, v. 16, pt. 1, p. 71.

The author modified Arruga's vacuum cataract extraction device by using a record syringe with a stopcock in the canula. (Illustrations.)

Ray K. Daily.

10

RETINA AND VITREOUS

Belaev, I. A. **Etiology of retinitis pigmentosa.** Viestnik Opht., 1937, v. 11, pt. 6, p. 862.

A review of the literature and brief clinical histories of five cases. The author concludes that Wagenmann's contention that the disease begins as a sclerosis of the posterior ciliary vessels was refuted by subsequent investigations. Changes in the sella turcica, hematologic studies, and changes in mineral metabolism convince the author that the cause of retinitis pigmentosa is polyglandular dysfunction.

Ray K. Daily.

Dubois, P., and Rasano, R. **Unilateral stellar retinitis.** Bull. Soc. d'Opht. de Paris, 1937, Feb., pp. 99-108.

Detailed study of a case of unilateral papillitis with vision rapidly reduced to 0.1, followed in five days by development of a complete macular star. Vision eventually came up to 0.3. Complete laboratory and clinical studies failed to show any pathologic variation, either systemically or locally, except enlargement of the blind spot proportionate to the papillitis. The authors suggest similar studies on patients free from usual causes such as diabetes, tuberculosis, and nephritis.

Harmon Brunner.

Epstein, E. D. **Coats's exudative retinitis and angiomatosis of the retina.** Viestnik Opht., 1938, v. 11, pt. 6, p. 880.

A report of a case of each disease and a review of the literature. (Photomicrograph.) Ray K. Daily.

Feig, I. **A case of angioma retinae.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 295-300.

An unusual case of angioma retinae is presented and described. An outstanding feature was that within an area approximately six to seven times the width of the papilla nothing but blood vessels was seen. Beyond this the retina could be seen. The general and also ocular condition of the patient is fully described. (References.)

D. F. Harbridge.

Lamb, H. D. **Exudative retinitis.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 618-641.

MacDonald, A. E. **Etiology of idiopathic retinal detachment.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 658-661; also Trans. Amer. Ophth. Soc., 1937, v. 35, p. 111.

Rosengren, Bengt. **Treatment of retinal detachment with diathermy and air injection into the vitreous.** Acta Ophth., 1938, v. 16, pt. 1, p. 3. (See Amer. Jour. Ophth., 1938, v. 21, April, p. 479.)

Sobanski, J. **The treatment of retinitis pigmentosa.** Klinika Oczna, 1938, v. 16, pt. 1, p. 44.

Therapy directed toward lowering ocular tension and stimulating vascular tonus is combined with galvanization of the cervical sympathetic plexus. In five cases thus treated the results were increased visual acuity and extension of visual fields. Ray K. Daily.

Stark, Adolf. **Purtscher's traumatic angiopathic retinitis.** Klinika Oczna, 1938, v. 16, pt. 2, p. 202.

In an accidental fall from a wagon a thirteen-year-old girl had a fracture of two ribs. Three days later examination of the right eye revealed the typical fundus changes described by Purtscher in 1910 (see Ophth. Year Book, 1912, v. 9, p. 238). The author believes that obstruction by a fat embolus accounts for the disturbance.

Ray K. Daily.

Wassermann, I. A. **Lauber's treatment of retinitis pigmentosa.** Viestnik Opht., 1937, v. 11, pt. 6, p. 868.

Eleven brief case histories treated by reduction of ocular tension and increase in general blood pressure show that the acuity of vision improved in all cases, and the visual fields in three.

Ray K. Daily.

Wood, D. J. **Night blindness in eye disease—suggestions and speculations** (Doyne Memorial Lecture). Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 469.

The author points out that in all cases of night blindness there is probably an abnormality in an intracellular enzyme which may interfere with metabolism; this abnormality being either hereditary or more susceptible to dietetic factors. The variable factor could result in disorders ranging from abnormality in retinal adaptation to a complete defect which is followed by destructive changes in the bacillary layer with eventual blindness.

Beulah Cushman.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Brailovskii, C. M. **Ocular complications in the incorrect use of plasmocide.** Viestnik Opht., 1937, v. 11, pt. 6, p. 792.

A plea for continued search for a preparation which would retain the therapeutic qualities of plasmocide and yet be free of its toxic properties. Heavy doses of plasmocide are very toxic to the visual and nervous systems.

Ray K. Daily.

Campos, R. **Experimental research on the papilla by stasis.** Arch. di Ottal., 1937, v. 44, July-Aug., p. 221, and Sept.-Oct., p. 267.

By applying a ligature on the optic nerve in sixteen rabbits and two monkeys, the author was able to produce a papilledema. In monkeys the ligature of the optic nerve produced venous stasis, followed by edema which extended rapidly to the retina. Microscopic examination demonstrated an early interstitial neuritis in the vicinity of the ligature, and intense edema of the optic nerve. H. D. Scarney.

Deggelev, A. B. **The significance of choked disc in the symptomatology of diseases other than brain tumor.** Viestnik Opht., 1937, v. 11, pt. 6, p. 771.

Through a review of the literature and his own material the author shows that the significance of choked disc diagnostically as well as prognostically is much greater in tumor of the brain than in other diseases. In acute encephalitis the development of choked disc does not make the prognosis worse, and the characteristics of choked disc in this disease are its tendency to recession and variations in its extent. In chronic serous meningitis impairment of vision with choked disc is an indication for decompressive intervention. In purulent affections of the ear the absence of choked disc does not eliminate the existence of intracranial complications. Its presence is definitely indicative of intracranial pathology, and may serve as a surgical indication. Choked

disc in diseases of the cardiovascular system is an unfavorable prognostic sign. Ray K. Daily.

Desvignes, Pierre. **Compression of the intracranial optic nerve.** Arch. d'Opht.-Rev. Gén. d'Opht., 1938, v. 2, May, p. 415.

A case of a meningioma compressing the intracranial portion of the right optic nerve in a man of 26 years is described. The physical signs were: (1) a sharply localized painful area in the right temple 3 cm. above the zygomatic apophysis; (2) slight left facial paresis; (3) bilateral papilledema, more on the left side; and (4) central scotoma in the right field of vision, with left vision and field normal. A successful operation improved the vision from 1/10 to 7/10. The differential diagnosis is discussed, and the clinical signs of (a) meningiomas arising from the lesser wing of the sphenoid, (b) olfactory meningiomas, and (c) suprasellar meningiomas. The author insists on the very great importance of a unilateral central scotoma as a sign of optic nerve affection (infection or compression). (Illustrations.) Derrick Vail.

Lundsgaard, Ruth. **A Danish family tree with hereditary optic atrophy.** Acta Ophth., 1938, v. 16, pt. 1, p. 89.

A review of the literature and a report of a family tree of seven generations, consisting of 82 men and 71 women. Twenty-six men and eight women had Leber's optic atrophy. Most of the carriers of the disease were women. This finding and the fact that the disease is by far more prevalent in men leads the author to believe that women transmit the disease to all their children, but only the daughters are capable of transmitting it further.

Ray K. Daily.

Mayer, L. L. **Tryparsamide therapy of neurosyphilis and atrophy of the optic nerve.** Jour. Amer. Med. Assoc., 1937, v. 109, Nov. 27, p. 1793.

From observation of 155 patients with various types of syphilis of the central nervous system, treated with tryparsamide and under rigid ocular control for a reasonable period of years, the author concludes that subjective reactions are not infrequent but are often due to suggestion. Severe objective signs of damage to the optic nerve occur infrequently with reasonable ocular control. Of patients treated with tryparsamide, the percentage of those benefiting so far as the optic nerve is concerned is far greater than the percentage of those in whom damage may occur. Patients with optic atrophy due to syphilis should have the advantage of the use of tryparsamide when the drug is indicated. (Discussion.)

George H. Stine.

Samuels, Bernard. **The histopathology of papilledema.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 529.

Findings are given on fifty globes removed after death, under the diagnosis of papilledema. The histologic findings indicate papilledema of short or long duration, with an interpretation of the fundus picture by the cellular changes. A circumpapillary tissue is described, which the author attributes to proliferation of Kuhnt's intermediary tissue. This tissue and a broad zone of cystic retina probably account for some cases of apparently marked edema. Cystic changes are frequently found also in the macular area of the retina and in the ora serrata. The enlarged blind spot may be due to the existence of a slit-

like circumpapillary detachment of the retina. (Illustrations.)

Beulah Cushman.

Sobanski, Januz. **Further observations on the decompressive treatment of tabetic optic atrophy.** Klinika Oczna, 1938, v. 15, pt. 6, p. 670.

A graphic report of the satisfactory results obtained in 55 patients. The treatment was directed toward lowering ocular tension and improving the retinal circulation. This was combined with specific treatment and education of the patient toward a hygienic régime. During the period of specific treatment the intraocular tension was held between 6 and 10 mm. Hg by miotics or operation. In the intervals between specific treatments the tension was allowed to rise to 16 or 18 mm. Hg. In cases with low general blood pressure the treatment was directed toward dilatation of the retinal vessels by administration of acetylcholine. Galvanotherapy was used daily for a month. Ray K. Daily.

12

VISUAL TRACTS AND CENTERS

Koslowski, Bogumil. **A case of ocular disturbance caused by gas emanating from a motor.** Klinika Oczna, 1938, v. 16, pt. 2, p. 176.

A driver of a motor car, covered to resemble a submarine, was asphyxiated by the products of gas combustion, which having no exit to the outside filled the cabin. When he regained consciousness nine hours after asphyxiation he could not see. Six days later when examined at the eye clinic he had a left homonymous hemianopsia which touched the fixation points. He recovered spontaneously within two weeks. Because he had no pupillary disturbance, the author localizes the lesion in the right lateral geniculate body, close to it, or in the internal capsule. The carbon monoxide may have produced an angiospasm, or a hemorrhage which compressed the visual pathways.

Ray K. Daily.

13

EYEBALL AND ORBIT

Biernacka-Biesiekierska, J. **The curvature of the cornea and the degree of exophthalmos.** Klinika Oczna, 1937, v. 15, pt. 6, p. 688.

The statistical report of the data obtained from examination of 987 persons shows that the smallest degree of exophthalmos is associated with hyperopia, and the greatest with myopia. The table showing the relation of exophthalmos to corneal curvature indicates that the greater the exophthalmos the flatter the cornea. Ray K. Daily.

Brunton, C. E. **Smooth muscle of the periorbita and the mechanism of exophthalmos.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 257-268.

The author finds that the smooth muscle behind the upper and outer periorbita of human subjects may be the functional analogue of the periorbital membrane of the lower animals and may be the medium for producing exophthalmos in man. For experimental purposes and findings the whole orbital region was removed intact from heads of dogs and cats. The study also included orbits of six cases of Graves's disease and three normal human controls. Of the human orbits examined only one with Graves's disease demonstrated any pathologic features. Experimental methods, results, and figures are described, with lucid discussion and

summary concluding the article. (Figures, references.) D. F. Harbridge.

Coutela and Offret, G. **Bilateral exophthalmos due to a myositis of undetermined cause.** Bull. Soc. d'Opht. de Paris, 1937, March, pp. 130-143.

A detailed report of a case of progressive exophthalmos beginning in the right eye and developing two years later in the left eye. Exploration of the right orbit for possible tumor caused such a violent reaction that the eye was subsequently lost. The only pathology found in the biopsy and necropsy was infiltration with plasma cells and lymphocytes, combined with violent vascular congestion. Only those muscles supplied by the oculomotor nerve were affected. Serial sections were studied, and no evidence of tumor, tuberculosis, mycosis, or syphilis was found. Full laboratory studies showed no pathologic variation. (19 references.)

Harmon Brunner.

Dimitry, T. J. **Bloody tears: bilateral capillary hemangiomas.** Jour. Amer. Med. Assoc., 1938, v. 110, Feb. 26, p. 643.

This is a case of tumor of the right and left orbits, symmetrical in design, identical in location, and of the same microscopic appearance. Bloody tears were often shed. Bleeding from the nose also occurred occasionally. How the blood reached the conjunctival sac was not known, but it was thought to be by regurgitation through the lacrimal canal. (4 illustrations.)

George H. Stine.

Eleonskaja, V. H. **Orbitopalpebral cysts.** Viestnik Opht., 1938, v. 11, pt. 6, p. 876.

A report of two cases. A man sixty years of age had a large orbitopalpebral cyst of the lower lid, which communicated with the vitreous chamber of a normally developed eyeball. His history was that the cyst had developed within the last two years. The other patient, eighteen years of age, had a cyst of the right lower lid, the size of a walnut, round, bluish, fluctuating, extending from the lower orbital wall, and lined with mucous membrane. It was probably a mucocele. Ray K. Daily.

Franceschetti, A. M., and Herrmann, R. **Asthenopia of Basedow's disease.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 128-131.

The authors report their experiences in two patients with Basedow's disease and mild hyperglycemia. The clinical condition improved after administration of insulin. Clarence W. Rainey.

Goldfeder, A. E., and Bushmich, D. G. **Hour-glass intraorbital and extraorbital dermoid cysts.** Viestnik Opht., 1937, v. 11, pt. 6, p. 817.

Two cases are added to the sixteen reported in the literature, and brief histories of the eighteen cases are tabulated. The diagnosis was made preoperatively in seven of these, and was missed in eleven because of the bizarre clinical appearance. Ray K. Daily.

Medvedev, H. I., and Aksenenok, V. I. **Improvement of the enucleation stump by scleroplasty.** Viestnik Opht., 1937, v. 11, pt. 6, p. 803.

The author used as an implant a scleral sac which had been freed of all other tissues, and had attached to it the four recti muscles. The resulting stump had better motion than is usual following implantation of gold, glass, or fat. (Illustrations.) Ray K. Daily.

Roberts, J. A. F. **Sex-linked microphthalmia sometimes associated with**

mental deficiency. Brit. Med. Jour., 1937, Dec. 18, p. 1213.

A family group is described in which microphthalmia is inherited as a sex-linked recessive condition in four generations, with some evidence that it can be traced for six generations, covering a period of about two hundred years. The six blind persons who were examined by the author showed various abnormalities associated with microphthalmia, such as corneal opacities, dislocation of the lens, lenticular opacities, nystagmus, and irregularities of the pupil.

The blindness was associated with mental deficiency ranging from feeblemindedness to extreme idiocy in four of the cases examined. The other two blind persons were mentally normal. Apart from the blindness there was no suggestion of any mental deficiency in the family. Edna M. Reynolds.

Schall, L. A. **Exophthalmos complicating irradiation.** Jour. Amer. Med. Assoc., 1937, v. 109, Nov. 6, p. 1506.

Exophthalmos developed in five cases as a result of irradiation treatment of malignant disease of the nasal sinuses. In three of the cases the condition occurred after operation and irradiation, and in two it followed irradiation alone. The exophthalmos may come on within 24 hours or its appearance may be delayed. Operative measures to protect the eye were of little value. With degenerative changes in the eye, orbital exenteration is necessary not only to relieve the constant, severe pain, but to diminish the possibility of orbital extension of the malignant disease. The pathologic process is essentially one of degeneration and vessel thrombosis. (6 figures and discussion.)

George H. Stine.

14

EYELIDS AND LACRIMAL APPARATUS

Chistiakov, P. I. **Correction of orbital symblepharon with Morax's plastic repair.** Viestnik Opht., 1937, v. 11, pt. 6, p. 795.

A report of a case in which the author combined Morax's blepharoplasty with transplantation of a piece of aural cartilage for the formation of a new upper lid. Ray K. Daily.

Goldfeder, A. E., and Bushmich, D. G. **The Blaskovics operation for ptosis.** Viestnik Opht., 1937, v. 11, pt. 6, p. 824.

On the basis of eleven cases, five of which are reported briefly, the author concludes that the results of the Blaskovics operation are superior functionally and cosmetically, and that the technique is suitable for any type of ptosis. (Illustrations.) Ray K. Daily.

Imre, Joseph. **Plastic operations of the eyelids.** Trans. Ophth. Soc. United Kingdom, 1937, v. 57, pt. 2, p. 494.

Each plastic operation must be modified for the individual defect. The skin of the immediate neighborhood is most satisfactory, therefore the sliding flap with curving lines has given the author the best results. (Illustrations.)

Beulah Cushman.

Lauterstein, M. **Blepharoplasty and plastic operations on the orbit with free transplants.** Klinika Oczna, 1937, v. 15, pt. 5, p. 584.

A description of the technique advocated by Meller in his book on eye surgery. Ray K. Daily.

Levitskii, M. A. **Blepharoplasty with free skin-grafts.** Viestnik Opht., 1937, v. 11, pt. 6, p. 798.

An analysis of immediate and final results of 126 plastic operations on the

lids with free transplants and Thiersch grafts. In three cases the transplants failed to take, the edges sloughing. In seven cases partial ectropion with imperfect closing of the lids was due to the grafts being too small. In the rest the immediate results were satisfactory. Follow-up observations in thirty cases showed the results functionally and cosmetically satisfactory.

Ray K. Daily.

Shimkin, N. I. **Transplantatio conchae auriculae as a new method of correcting spastic entropion of the upper lid following total tarsectomy.** Brit. Jour. Ophth., 1938, v. 22, May, pp. 282-287.

To overcome the disadvantage of there not always being available material for plastic operation, the author made use of the external ear. The three steps of the operation are fully described, with satisfactory results in five cases. (Figures.) D. F. Harbridge.

Spaeth, E. B. **Ptosis.** Jour. Amer. Med. Assoc., 1937, v. 109, Dec. 4, p. 1889.

The various surgical procedures for the correction of ptosis are described and illustrated, and a table of indications in different types is given. It is emphasized that the surgical treatment of ptosis must be as variable as are the causes of ptosis and the many other circumstances connected with it. Better diagnostic studies of the individual case are necessary if more brilliant surgical results are to be obtained. (20 figures, discussion.) George H. Stine.

Szejnkierowa. **A case of tuberculous dacryocystitis.** Klinika Oczna, 1938, v. 16, pt. 1, p. 72.

The diagnosis was made by inoculation of the contents of the lacrimal sac into a guinea pig, and demonstration of tubercle bacilli in its peritoneal lymph glands. The disease was at first arrested by X-ray therapy, and for two months the sixteen-year-old patient was free of symptoms. Later the epiphora and purulent secretion returned. The sac was enucleated and pathologic examination confirmed the diagnosis. (Photomicrograph.) Ray K. Daily.

Veis, A. S., and Starostina, O. I. **Streptothrix infection of the lacrimal sac and canal.** Viestnik Opht., 1938, v. 11, pt. 6, p. 887.

A report of this rare affection. The diagnosis was made after staining the concretions found in the extirpated lacrimal sac. (Photomicrograph.)

Ray K. Daily.

Wieczorek, Antoni. **Radiologic studies of the nasolacrimal canal.** Klinika Oczna, 1937, v. 15, pt. 5, p. 559.

An explanation of 35 roentgenographs of the lacrimal sacs injected with lipiodol. This form of study of the lacrimal passages is not merely of academic value: it demonstrates the abnormalities of the passages and of neighboring structures, and in surgical cases visualizes the operative fields.

Ray K. Daily.

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TUMORS

Bahr, Gunnar. **A case of myoblastic myoma of the lacrimal sac.** Acta Ophth., 1938, v. 16, pt. 1, p. 109.

A report on a woman of 49 years with dacryostenosis and a small tumor the size of a large pea behind the lacrimal sac. The neoplasm was excised with the sac. Microscopic sections showed it to be a myoblastic myoma, probably orig-

inating from the muscle fibers of the orbicularis. (Photomicrographs.)

Ray K. Daily.

Kapuscinski, W. J. **A rare case of orbital metastasis of carcinoma of the breast.** Klinika Oczna, 1937, v. 15, pt. 6, p. 707.

A 62-year-old woman came to the clinic complaining of diplopia and of pain in the left eye. A general examination showed that she had cancer of the right breast with enlarged axillary glands. The breast and glands were removed. Six months later she returned to the eye clinic, with left partial ptosis and immobility of the left eyeball. The X-ray picture showed a tumor at the apex of the orbit. The orbit was exenterated and a month later treated with radium. Histologic sections showed carcinomatous infiltration of the ocular muscles, the lacrimal glands, the nerves, and the ciliary vessels. The optic nerve was uninvolved. (Illustrations.)

Ray K. Daily.

Newton, F. H. **Local recurrence of melanoma of choroid thirteen years after enucleation.** Amer. Jour. Ophth., 1938, v. 21, June, p. 668.

Pokrovskii, A. I. **Tumors of the orbit.** Viestnik Opht., 1937, v. 11, pt. 6, p. 850.

Two cases are reported, one of hemangio-endothelioma in a boy ten years of age, and one of psammoma in a four-year-old. A thorough review of the literature is given. (Illustrations.)

Ray K. Daily.

Roche, Thiers, and Martin. **The ophthalmologic aspect of a case of chordoma.** Bull. Soc. Franç. d'Opht., 1937, v. 50, pp. 70-79.

The authors describe the case of a 76-year-old female, whose chief complaints were nasal obstruction and loss of visual acuity. A sphenoidal tumor was found, and the biopsy specimen was characterized by the presence microscopically of physaliferous (containing bubbles) cells, which were large and rounded. The nucleus was centrally placed. Between the nucleus and the cell membrane were vacuoles free from artifacts. The features of the ophthalmologic and external examination were a double senile ectropion, a mild exophthalmos, lowered visual acuity, numerous exudates and changes of the type of senile macular degeneration, pallor of the discs, especially in their nasal portions, and peripheral losses in the visual field of each eye. There was elevation of intraocular arterial tension, and paralysis of the abducens nerve on the right side. X-ray films indicated bony losses in the region of the sella turcica, so that the sphenoid sinus seemed to be open. Among 47 cases of cephalic chordoma studied in the literature, the authors found that in thirty the ophthalmologic were the only symptoms. Clarence W. Rainey.

Sanders, T. E. **Metastatic carcinoma of the iris.** Amer. Jour. Ophth., 1938, v. 21, June, pp. 646-651.

Schweig, S. J. **Epithelioma of the lid arising from the cicatrix of a lacrimal-sac excision.** Klinika Oczna, 1938, v. 16, pt. 2, p. 200.

A man aged 52 years was found to have an epithelioma in the region of the lacrimal sac. Twelve years previously the sac was excised, but the purulent discharge continued. The author raises a question as to the possibility of the prolonged irritation being the etiologic factor in causation of the malignancy in the cicatrix. (Illustration.)

Ray K. Daily.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. George Herbert Mathewson, Montreal, died March 18, 1938, aged 68 years.

Dr. Royal Samuel Copeland, New York, died June 17, 1938, aged 69 years.

Dr. Abraham Royden Gregory, Jacksonville, Illinois, died April 8, 1938, aged 59 years.

Dr. Paul J. Pontius, Philadelphia, died February 16, 1938, aged 70 years.

Dr. Ira M. Tripp, Cleveland, died May 31, 1938, aged 68 years.

Dr. Lewis Webb Crigler, New York City, died April 30, 1938, aged 61 years.

Dr. Willard Curtis Proud, St. Joseph, Missouri, died April 29, 1938, aged 64 years.

Dr. Charles M. Culver, Delmar, New York, died May 8, 1938, aged 82 years.

Miscellaneous

The Ophthalmic Board of Examination previously scheduled for November 15th at Oklahoma City has been cancelled. Examinations are scheduled for New York City, October 7th, and Washington, D.C., on October 8th.

The Henry L. Wolfner Memorial Library for the Blind was formally dedicated June 6, 1938, to the memory of the physician, who specialized in ophthalmology, and to the service of the Saint Louis Society for the Blind. The ceremonies were held in the institution's headquarters at 3844 Olive Street. At the dedication exercises in the assembly room the Hon. O'Neill Ryan, president of the Library Board, was presiding officer. The opening address was given by the Hon. Bernard F. Dickmann, mayor of Saint Louis; the presentation of the building was made by Dr. Meyer Wiener. This library is a gift to the Saint Louis Public Library from the citizens of Saint Louis. Dr. Meyer Wiener, president, and his associates on the Board of Directors of the Henry L. Wolfner Memorial Library for the Blind Corporation, raised the funds for the purchase of the building and for its adequate equipment and furnishings. The basement and first floor house the library, provide a reading room, offices, and stacks for 40,000 Braille volumes and talking-book records. The library now has 23,000 volumes, so that the stacks provide room for growth. The Community Center on the second floor provides ample meeting rooms for organizations of the blind. The building will be open on week days from 9 A.M. to 5 P.M. and evenings for meetings of organizations of the blind when arrangements have been made in advance with the branch librarian. Charles H. Compton, librarian of the Saint Louis system, said that in the last few years the number of Braille volumes sent out by parcel post has increased from a few thousand a year to more than 80,000 at present. The new branch will be in charge of Mrs. Martha K. Stark, who has served the Saint Louis Library for seven years as librarian for the blind. She will be assisted by a staff familiar with the special service. The building has two stories and a basement and is said to have originally cost $140,000.

The following officers of the American Ophthalmological Society were recently elected: president, Dr. Frederick T. Tooke, Montreal; vice-president, Dr. E. V. L. Brown, Chicago; secretary-treasurer, Dr. Eugene M. Blake, New Haven; editor of the Transactions, Dr. Bernard Samuels, New York. The following men make up the Council: Dr. John Green, Saint Louis, Dr. S. Judd Beach, Portland, Maine, Dr. John W. Burke, Washington, D.C., Dr. Adolph O. Pfingst, Louisville, Kentucky, Dr. J. Milton Griscom, Philadelphia. The Committee on Theses: Dr. John H. Dunnington, New York; Dr. Sanford R. Gifford, Chicago; Dr. Francis H. Adler, Philadelphia. The Program Committee: Dr. Parker Heath, Detroit; Dr. Frederick T. Tooke, Montreal; Dr. Eugene M. Blake, New Haven.

The Seventy-Fifth Annual Meeting will be held at The Homestead, Hot Springs, Virginia, June, 1939.

The Chicago Eye, Ear, Nose and Throat College will hold its fall school in "Advanced surgery of the eye and adnexa" from October 31st to November 6th, inclusive.

The autumn Course II of the Cook County Graduate School of Medicine will start Monday, September 26th, if six doctors are enrolled on September 12th. This change is made upon request from doctors who desire to attend the course before the Academy meeting in October.

The Sixty-Seventh Annual Meeting of the American Public Health Association will be held in Kansas City, Missouri, October 25 to 28, 1938. There will be symposia on industrial-hygiene administration, venereal-disease con-

trol, laboratory diagnostic methods, expanding responsibilities in public-health engineering, maternal and child health, frozen desserts, industrial hazards, water and sewerage, typhoid fever, the next step in school health services, milk and dairy products, and many other important subjects. The preliminary program will be published in full in the August issue of the American Journal of Public Health, published by the American Public Health Association at 50 West 50th Street, New York City.

The Journal tendered a luncheon to its editors, directors, collaborators, and stockholders at the Mark Hopkins Hotel during the meeting of the American Medical Association in San Francisco. A moving-picture camera was presented to Dr. Jackson in recognition of his 20 years with the Journal, during 10 of which he was editor in chief. An outline of the present situation regarding number of subscribers, finances, character, and size of the Journal was given. The report was extremely satisfactory. The condition seems to be the best in the history of the publication.

About 25 were in attendance at the luncheon. The occasion was so agreeable that it is hoped the idea may be repeated soon.

Personals

Dr. Frederick A. Wies announces the removal of his office to 255 Bradley Street, New Haven, Connecticut.

Dr. A. B. Bruner, Associate Professor in Ophthalmology, Western Reserve University School of Medicine, Cleveland, is spending a six weeks' holiday at his cottage in Gananoque, Ontario, Canada.

At a recent dinner meeting of the Ashland County Medical Society at Loudonville, Ohio, Dr. Paul Motto talked on "The trachoma problem in Egypt."

Dr. Paul Motto recently spoke to the summer class in Public Health Nursing, Western Reserve University, Cleveland, on "Some public-health problems in ophthalmology."

Recent promotions in the Ophthalmological Department of Western Reserve University School of Medicine, Cleveland are: Dr. Josephine K. Dirion, Senior Clinical Instructor; Dr. John E. L. Keyes, Senior Clinical Instructor in Ophthalmological Pathology; Dr. Paul G. Moore, Assistant Clinical Professor in Ophthalmology; Dr. Paul Motto, Assistant Clinical Professor in Ophthalmology.

Dr. Luther C. Peter, Professor of Ophthalmology at the Graduate School of the University of Pennsylvania, received the Honorary Degree of LL.D. from his alma mater, Gettysburg College, on June 6th. Twice before Dr. Peter has been recipient of an honorary degree, receiving the Sc.D. from his alma mater, Gettysburg, in 1926, and again from Susquehanna University in 1934.

Dr. Louis R. Bushman announces the removal of his offices to Suite 627 City National Bank Building, Omaha, Nebraska.